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SOME DUTCH HOUSES IN THE HUDSON VALLEY

A REVIEW BY

CLIFFORD WAYNE SPENCER

As an archæological source for architectural inspiration the early houses in and about the Hudson River valley are particularly rich in those admirable qualities of domestic quaintness so much to be desired for homes of all classes. As one drives about among the pleasant valleys of the region one comes everywhere upon comfortable, substantial farmhouses which, although often greatly altered in appearance by additions and so-called improvements that have been made from time to time, still preserve in their walls and in many of their details the characteristics incorporated by the original Dutch settlers. And if one is sufficiently interested to go farther afield and explore the byways and country lanes, one is sure to have the search rewarded by the discovery of examples even less spoiled by the march of progress. Then, too, there are in the towns, such as Albany and Kingston, remnants of the dwellings of the sturdy burghers, some of which have been preserved in their original state by public societies or by appreciative owners. As in the case of other examples of early American architecture, the authentic original examples become fewer and harder to find as time passes, and it is probable that the tendency toward the desertion of farms in this part of the country will have the effect of allowing many more to fall into ruins within the next few years. Many of the finest have already become mere memories, and the appearance of still others is preserved only in the form of indistinct and inadequate photographs or crudely made drawings.

The Bevier-Elting House, New Paltz

In order that the treasures still in existence may be preserved for the enjoyment of future generations, and the documents now so widely scattered and difficult of access may be assembled and presented in such a manner as to afford a picture of the lives of the people who built and lived in the houses, Helen Wilkinson Reynolds undertook for the Holland Society of New York a field survey of the houses and an investigation of the records pertaining to them as found in both public and private libraries. With the assistance of Margaret de Motte Brown, who made the camera studies, she visited and carefully studied a great number of houses built in the counties of Westchester, Albany, Dutchess and Ulster before the American Revolution. The volume in which she presents the results of these studies and pilgrimages constitutes a noteworthy architectural document, though its author disavows any intention of treating the subject from an architectural viewpoint, but rather from that of archæology as a record of human society, and of the peculiar genius of a given community. In spite of this statement on the part of the author it is easy to see that she has a keen understanding and appreciation of the essential qualities of good architecture. Had the work been studied and prepared as a purely architectural volume, its quality as such could not have been improved; in fact, it is highly probable that much of the natural charm of the present work would have been lost had it been subjected to any such professional limitations.

A great part of the charm of the volume lies in the extreme simplicity of the houses shown, for, as Miss Reynolds explains, with few exceptions the houses built by the Dutch settlers were of the greatest possible simplicity and quite unpretentious. Legends of the grandeur of family seats and manor houses are more often than not the results of false family pride or of pure imagination. The main concern of the early settlers was to provide themselves with protection against the elements, and the first dwellings were often in the form of rough dugouts in which families spent the first few years until land could be cleared and there was time to erect more comfortable dwellings. The hardships which these pioneers endured cannot be exaggerated, and it is not to be expected that under these circumstances people would spend much time in erecting for themselves pretentious homes. It is true that there were varying degrees of prosperity among the settlers, but the homes of the more prosperous were not greatly different from those of their humbler neighbors. It is characteristic of the rugged fearlessness of the Dutch settlers that, in general, their homes are not clustered in villages as is so largely the case with those of many of the English settlers of that period, but are more likely to be found in the form of isolated farms snuggling away by themselves.

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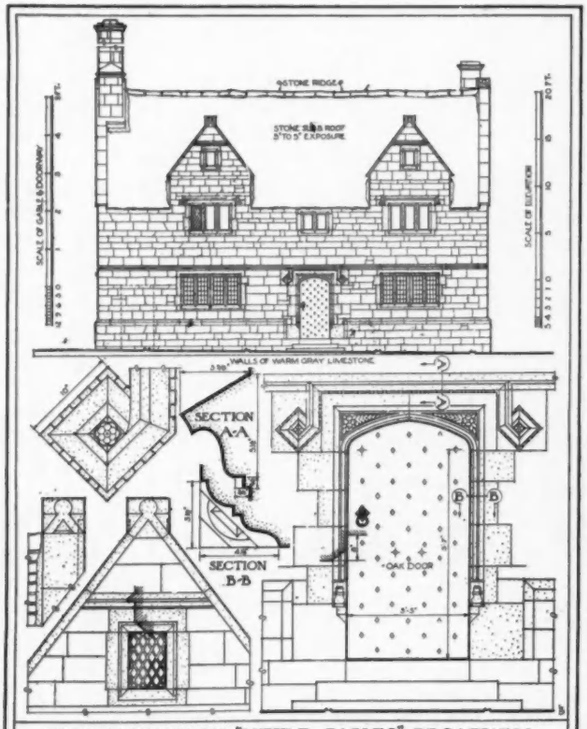
Tudor Homes
OF ENGLAND

Sketches — Photos — Details

By SAMUEL CHAMBERLAIN



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Working from carefully prepared data, the author visited most of the Tudor mansions of importance in central and southern England, and sketched and photographed many remote and unheralded houses of unique interest. The stone houses of the Cotswolds, the plaster cottages of Essex, the timbered work of Cheshire and Herefordshire, the brickwork of Norfolk, all of these pure types, and innumerable variations of them are fully treated. Manors as famed as Horham Hall, East Barsham Manor, Stokesay Castle and St. Osyth's Priory are illustrated side by side with such obscure and delightful places as Madeley Court, "Josselins" at Little Hookesley, and the rectory at Great Snoring. All of the material has been selected with the predominating purpose of providing data and illustrations which will furnish practical, adaptable information for the domestic architect in this country.

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The charm of the Dutch Colonial style has long been recognized and employed in the design of modern American small houses. This adaptation has however been of a rather stereotyped nature and is characterized largely by the form of the roof, a gambrel roof often being the only excuse for calling this type of building "Dutch." As a matter of fact only a limited number of the Dutch houses possessed this feature, and it is much less important as a distinguishing mark of Dutch Colonial than are many other details. Certainly there is no excuse for monotony in the treatment of houses adapted from this type of precedent. While the bulk of the houses presented are of purely Dutch origin, there are some which by reason of their having been constructed during the same period are included even though they are not strictly Dutch in their derivation. Many of the colonists of New Netherlands were from countries other than Holland, and although the colony was under Dutch rule and while a strong influence of the architecture of the motherland is evident in the homes of the settlers, there are also traces of more northern European tendencies. The predominating feeling that one gets from these houses, however, is of something not borrowed from the customs of any foreign country but born of the soil of the new land, the result of the severe conditions under which the settlers lived. There is a solidity that suggests a closeness to the soil, and the very crudeness of the materials and workmanship lends a charm that is to be found only in primitive things.

In the text the author of this work has sketched briefly the historical background against which the houses are to be viewed, telling how the fur traders followed closely on the heels of the explorers and established their posts at Beverwyck (Albany) and at Wiltwyck (Kingston) and how the farmers followed the courses of the contributory streams inland and established their homes in the fertile valleys and plains. The materials of which the houses were built are of course largely of stone and brick. In connection with the latter material the author gives an interesting explanation of the often repeated legend that many of the houses were built of brick brought from Holland, to the effect that under both the Dutch and English law there were certain standard measurements to which brick in those countries had to be made, and it was only natural that in the new country brick in the one size should be called "English" brick and those in the other size "Dutch" brick, the result being that someone hearing that his ancestor had built his house of Dutch brick assumed that the brick had been brought from Holland, and passed the tradition along to posterity as a fact. Some few brick were no doubt imported from Holland in this way, but the number was so small as to be negligible, and practically all the brick were made in the domestic brick kilns which were founded soon after the establishment of the colony and whose operation soon became a flourishing industry.

Fortunately many of the houses were dated, either by numerals cut in the stonework or by wrought iron ornamental letters on the chimneys or facades of the buildings. This, although not of paramount importance from an archæological point of view, serves to give an indication of the periods during which the various types of construction and ornament, if any, were used. Inlaid brick of contrasting colors were also sometimes used to give the date of construction or the initials of the builder.

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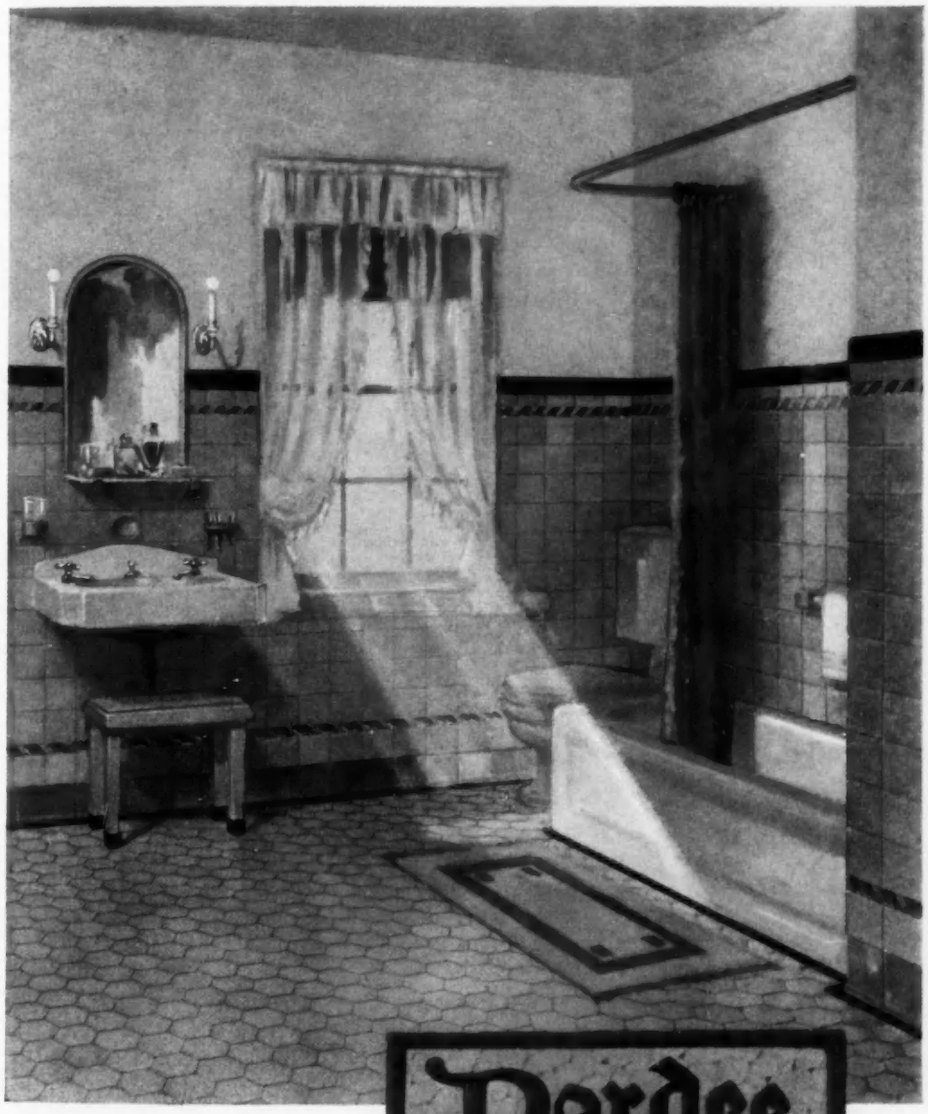

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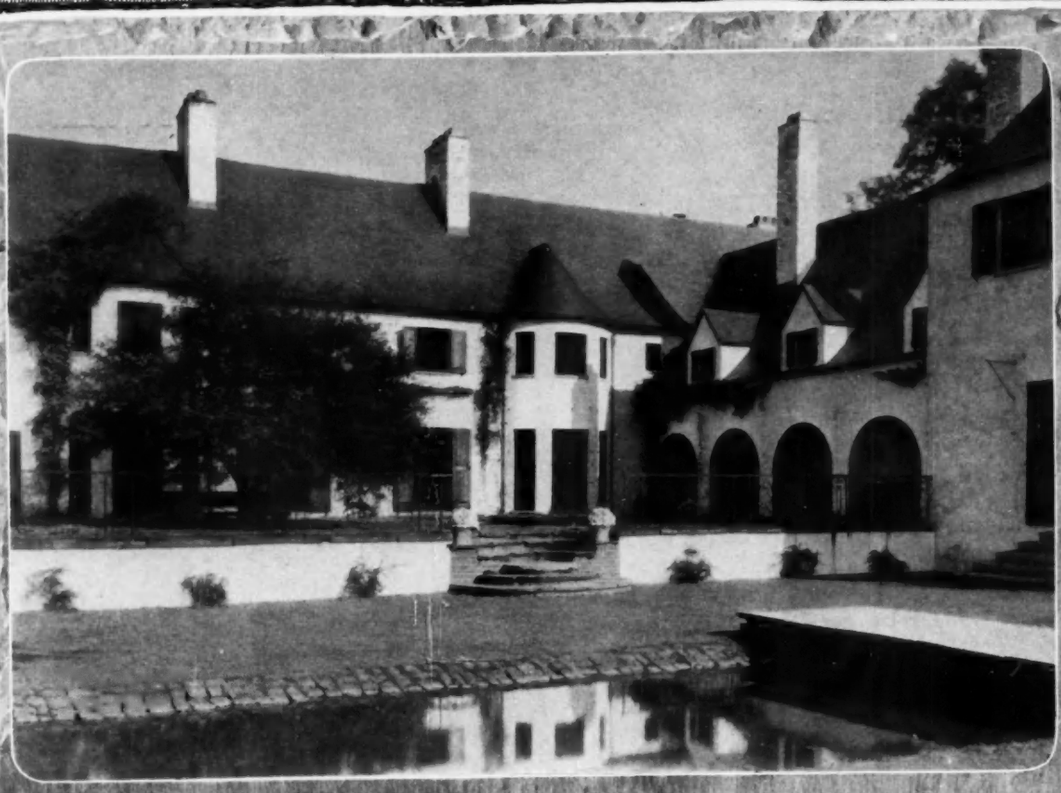

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CHICAGO DETROIT PHILADELPHIA BOSTON

In architectural detail the buildings are quite simple as regards ornament, their characteristic appearance being due largely to the general proportions and to the slopes of the roofs. In the early houses the roofs were either extremely steep or rather low and sweeping. The gambrel roof was a later development which became quite popular. Hip roofs were also used in a few of the more pretentious of these houses. Chimneys were large, and windows comparatively few, while the timbers and floor beams were often enormous. Doors were typically Dutch, being low and wide and often divided horizontally so that the upper part might be opened while the lower remained closed. In the later period, when there were more time and money to devote to embellishment, a few of the homes of the more well-to-do showed balustrades along the roof lines. The folklore which Miss Reynolds has gathered in the course of her investigations is woven throughout the fabric of the text and adds a touch of romantic interest to what might otherwise be a rather monotonous and long list of houses, dates, and names. Many of the legends of this neighborhood, which is so preëminently rich in tradition, are recounted.

For the purposes of the book several counties are grouped together under the main headings. The first of these is Albany County, which includes not only Albany itself, but also Columbia, Rensselaer, Greene, and Schenectady. In the introduction to this part of the book the author presents a detailed picture of life during the early days in this particular locality. The bulk of the letterpress of the work consists of a list of the houses themselves, and there are over 150 of them, with a description giving the dates, the names of owners, and interesting legends or historical facts connected with each particular house. The examples chosen were selected with the fact in mind that the work was being prepared under the auspices of the Holland Society, and houses were included on the same basis on which members are admitted to the Society itself. That is, their builders must have been citizens or descendents of citizens of New Netherlands prior to the year 1675. Although this might seem to put an arbitrary limitation on the quality of the volume, such is not the case, as the number of examples available is so great as to leave plenty of leeway for the exclusion of the less interesting.

Valuable as is the text of this work, it would hardly be complete without adequate illustrations to supplement the descriptions, and this is abundantly provided.

DUTCH HOUSES IN THE HUDSON VALLEY BEFORE 1776. By Helen Wilkinson Reynolds. 467 pp., 8 x 11 ins. Price $15. Brewer & Warren, Inc., 6 East 53rd Street, New York.

A STUDY OF THE MODERN SKYSCRAPER

WHEN buildings became and then began to exceed 14 or 16 stories in height, opposition to these and greater heights became common. Reasons of all kinds were advanced to uphold the contentions of height-limitation proponents. That these heights were uneconomic and would entail losses on the owners was one common objection; and fantastic claims were made about detriments to health, dangers to life, and street congestion. Experience has exposed the fallacy of these claims, but with the advent of extreme heights, ranging from 50 to 80 stories, the question of height economics became one that was entitled to serious consideration. Profitable ownership is essential to economic welfare.

Some architects have made investigations for their clients to determine the economic building height and have arrived at conclusions that do establish the plan and height limits. These studies, being the property of the owners, have not been made public, and the methods of investigation have not been disclosed. A disinterested and comprehensive investigation of the subject of the economic building heights has been made by W. C. Clark, Economist and Vice-President, S. W. Straus & Co., and J. L. Kingston, architect, with the collaboration of the most competent available experts. Clark employed what might be termed a "direct action" method. A definite site was selected and its value appraised. Under the New York code, a tower of unlimited height can occupy 25 per cent of the ground area, and it was evident that a large tower area was necessary to accommodate the required number of elevators and provide sufficient rentable floor area. In order that the height of the tower should not be limited by these considerations, a site 200 x 405 feet in size was selected. Plans and estimates of building cost, income, fixed and operating expenses were made of buildings 8, 15, 22, 30, 37, 50, 63 and 75 stories in height. Comparisons were made, and it was found that the law of diminishing returns set in above 63 stories in height.

The value of this work lies in the demonstration of certain economic principles that can be applied to sites of any size and value for the determination of the economic height of buildings. It also indicates the various factors that must be considered by the experts in the formulation of a correct conclusion. The architect and his engineers are the keymen, since everything except land value is controlled by the plan and the cost of construction. Building economics pertaining to value rather than cost of construction are receiving increasing attention, and their influence on architecture and architectural practice is evidenced by the frequency with which architects advise their clients not to engage in building projects that are not demonstrably profitable. In former days the architect merely planned and constructed as dictated to by the client. The architect is now, as he should be, the financial adviser of his client.

The subjects of the effect of tall buildings on public health, public safety and street traffic congestion are considered in the light of the latest *valid* data procurable, and many of the assumptions made by visionary idealists are shown to be just that,—assumptions. This book should be studied by architects, owners, bankers, realtors, building managers and contractors, because it is a clear and understandable exposition of the subject. Students of economics will find it a valuable source of information, and, if he will read it, the idealistic visionary will feel its sobering effect.

THE SKYSCRAPER: A Study in the Economic Height of Modern Office Buildings. By W. C. Clark and J. L. Kingston. 164 pp. 6 x 9 ins. illustrated. Published by the American Institute of Steel Construction, Inc., New York. Price, $2.

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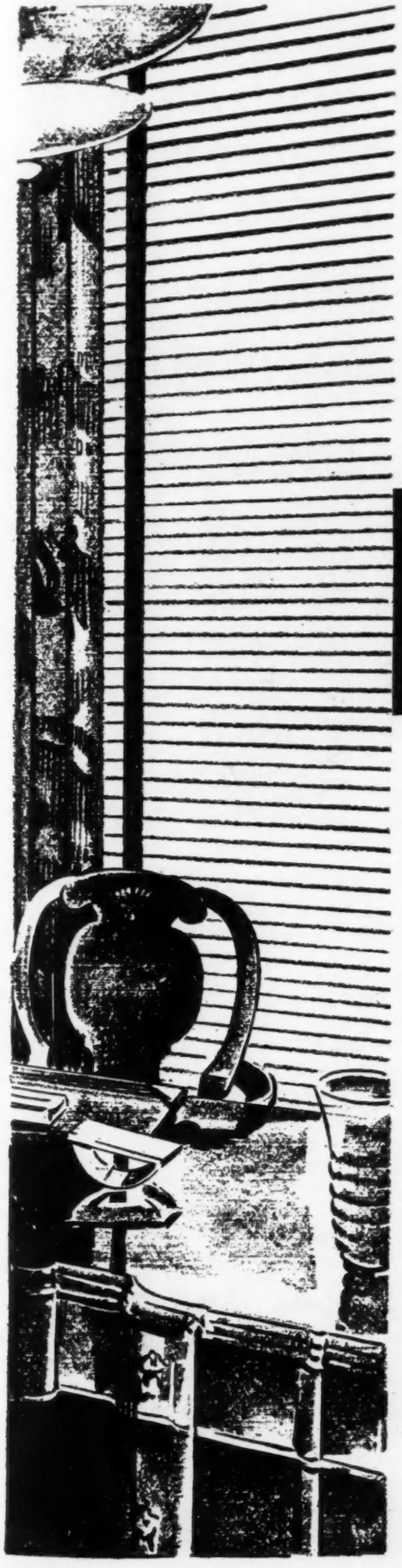

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THE EDITORS' FORUM

THE A. I. A. CONVENTION

COMPLETING his second and last year as President, C. Herrick Hammond, of Chicago, opened with a brief address of welcome the Sixty-third Convention of the American Institute of Architects in the Mayflower Hotel, Washington, May 21, 1930. The first day was devoted to a symposium on Contemporary Architecture, in which tradition, function, precedent and originality, as various sources of inspiration, were discussed vigorously. Advocates of both the new and the old were heard from. The first address was by George S. Howe, of Philadelphia, who daringly defended the originality and the disregard of precedent which characterize all so-called "Modern" work. This plausible plea for freedom in design was followed by a dramatic defense of architecture adapted or derived from historic precedent by C. Howard Walker, of Boston. Well known to all not only as an architect but also as a teacher of architectural history and design, this much beloved and vigorous dean of the profession strenuously and eloquently defended the cause of traditional architecture, stressing the unbroken sequence and relation of each succeeding style, and the natural continuity in architectural design throughout the ages. Earl H. Reed, Jr., of Chicago, talked about and showed views of recent buildings in the middle west which possess originality and freedom from precedent. Ralph T. Walker, of New York, far famed as one of the architects of several of the greatest and newest of the commercial towers on Manhattan Island, spoke conservatively and constructively in favor of modern design. Everett V. Meeks, the brilliant and efficient head of the Yale Architectural School, delivered a scholarly and convincing address in defense of the logical and justifiable continuance of tradition in architectural design. The many lantern slides with which Dean Meeks emphasized and illustrated the salient points in his address were of unusual interest and showed a far-reaching knowledge and a deep appreciation of the great architectural achievements of recent decades. Had judges been appointed to decide who won in this never-ending contemporary debate, the verdict would have undoubtedly been a tactful disagreement.

The remaining days of the Convention were taken up chiefly with routine business, the reading of the report of the Board of Directors and the election of officers. The evening of Wednesday, May 21, was given over to an animated discussion of "Advertising Architecture," and "Should the Architect Advertise?" As usual a great difference of opinion was found to exist on this very controversial subject, and no definite conclusions or results were arrived at. When architecture becomes a business and is no longer a profession, then will be the time to seriously consider the subject of advertising. The evening of Thursday was devoted to the interesting and important subject of Architectural Education, featuring the thoughtful and stimulating address of Leicester B. Holland. The Fine Arts Medal was awarded to Adolph Alexander Weinman for achievement in sculpture, and the Craftsmanship Medal to John Kirchmayer for achievement in wood carving. On Friday evening, May 23, the Convention closed with a formal dinner followed by addresses by two members of the House of Representatives, Robert Luce, of Massachusetts, and Louis C. Cramton, of Michigan, and an address by Walter Pritchard Eaton, the writer and dramatic critic of Boston, after which came the announcement of elections, which showed that the destinies of the American Institute of Architects during the next two years have been entrusted to these well known and very efficient men: President, Robert D. Kohn, of New York; First Vice-President, Ernest G. Russell, of St. Louis; Second Vice-President, Horace W. Peaslee, of Washington; Treasurer, Edwin Bergstrom, of Los Angeles; and Secretary, Frank C. Baldwin, of Washington.

THE FONTAINEBLEAU SCHOOL

ABOUT 125 American artists and art students will be registered at the American School of Fine Arts at Fontainebleau for the coming summer session, according to an announcement made by Jacques Carlu, director of the school and professor of architecture at the Massachusetts Institute of Technology, at the New York office of the Fontainebleau School at 119 East 19th Street. The summer session will begin on June 25 and continue for three months.

The Fontainebleau School, which was founded eight years ago through the initiative of the French Government and the Ministry of Fine Arts, as an outgrowth of the school for American soldiers established in France immediately after the Armistice, occupies one wing of the palace of Fontainebleau, and students are given free access to the palace collections and grounds. Administration of the school is in the hands of a French committee, and the enrollment of students is under the direction of a committee of prominent Americans, among them, Whitney Warren, Ernest Peixotto, Edwin H. Blashfield, Kenneth M. Murchison, J. Monroe Hewlett, James Earle Frazer, Benjamin Wistar Morris, Howard Greenley, John Mead Howells, Hermon A. MacNeil, James Gamble Rogers, Harvey Wiley Corbett, W. Howard Hart, and Ronald H. Pearce.

THIRD CHURCH BUILDING COMPETITION

THE *Christian Herald* announces its Third Church Building Competition. This competition applies to churches already built which must have been completed within the last five years. Ten cash prizes will be awarded on the basis of photographs and floor plans to be entered by participating architects. More than six million dollars' worth of churches were entered in the 1929 *Christian Herald* Church Building Competition. The entries will be judged in Cleveland, October 8-12, 1930. Entries must be received by midnight, September 30, 1930.

An interesting group of San Francisco's newest buildings —all Corbin equipped.

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(lower left)
THE SHELL BUILDING
Architect: Geo. W. Kelham
Builders: P. J. Walker Co.

◆

(lower right)
SIR FRANCIS DRAKE HOTEL
Architects: Weeks & Day
Builders: Lindgren & Swinerton, Inc.

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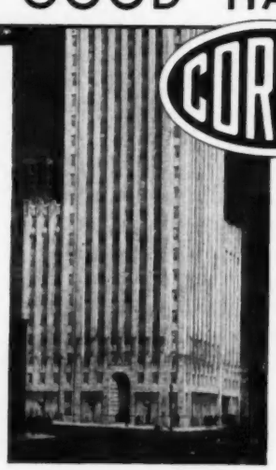

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THE ARCHITECTURAL FORUM

VOL. LII, No. VI — JUNE, 1930

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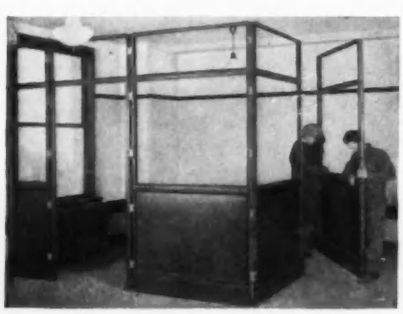

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THE
ARCHITECTURAL
FORUM

VOL. LII NUMBER SIX

JUNE 1930

THE EMPIRE STATE BUILDING ORGANIZATION

BY

R. H. SHREVE

SHREVE, LAMB & HARMON, ARCHITECTS

In this, the first of the series of articles that will present in logical order the development of the Empire State Building, New York, Mr. Shreve explains the organization and coördination of the group that is functioning to produce, in record time, the tallest office building under construction.

ONCE, in those high and far off times when all women were beautiful and the brave deserved the fair, even the boldest of knights hesitated to challenge the ukase of one who called himself an architect. Truly the architect walked among the great, and none held his head higher. All wisdom was his. Omniscience sat upon his brow; omnipotence dwelt in the sweep of his hand. To the erectors and his menials he said, "Do thus and thus, and that quickly and without question"; to his king he said, "Thus have I decided, question not the wisdom of one to whom Art herself has whispered in profound intimacies the secrets she imparts only to her most favored."

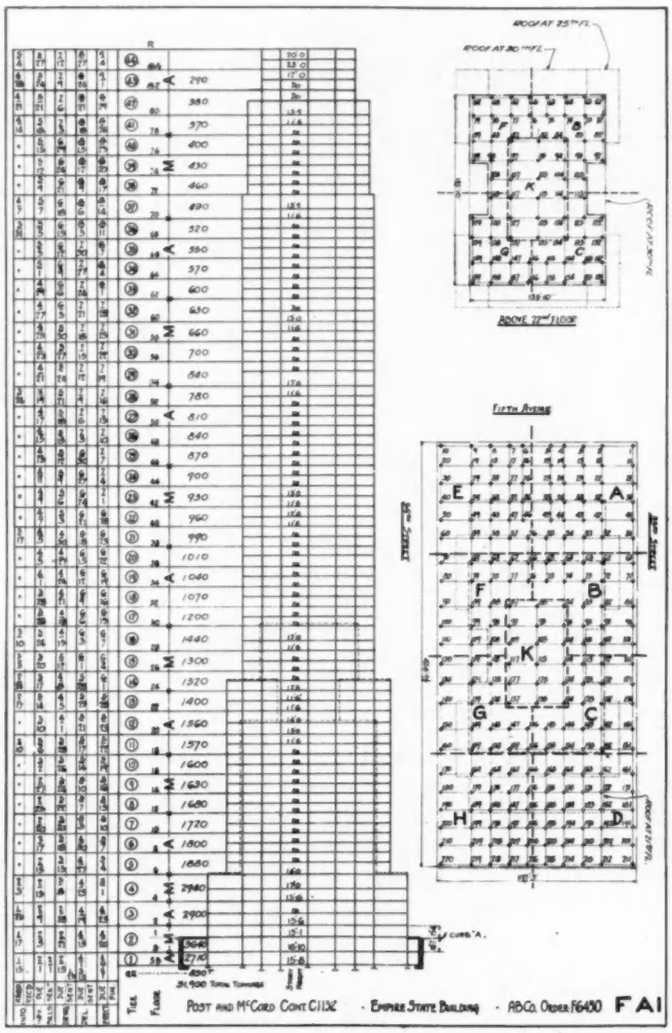
Woe betide those who dared question his dicta. The great feared to be made little in the eyes of their peers as though knowing naught of Esoteric Harmonies. The lowly who came beneath the sway of his command, workers in stone or steel, artificers, expert foremen of the guilds, walked softly in his sight and with shut mouths. He exacted an unquestioning obedience, for he was the architect, and in him were all wisdom and authority.

* * *

Today the world knows little of this legendary hero. The architect is still the leader in his art, —the coördinator of constructive forces, the master of his craft, but in the field of such intense activity as surrounds the construction of the great modern railroad terminal, in the lofty span and deep-seated base of the modern bridge, in the towering commercial structures of our large cities, in all of these the architect has his role, but as part of an organization,—not as a despot.

That this must be true is evident if one studies the numerous questions which are presented in the course of the development and construction of any large modern business building. These problems must be dealt with through authority greater than the architect possesses; many of them require ability, experience and organization beyond the scope of a single professional unit,—or would, if undertaken by the architect's office, involve a duplication of effort and a loss of time too expensive to be tolerated in an operation requiring large capital investment.

The location of the plot to be built on, the use to be made of the structure, the nature of the space enclosed, and the time at which completion should permit occupancy, all affect the success of the project and should all be determined by the owner with the coöperation of his rental, management and operating staffs. Only the most thorough study of these steps in the program will pave the way to success. No experimenting is possible. Some help may be gotten from the records of others, from failures perhaps more than from successes; but once the decision is made and carried out there is no opportunity for reconsideration. The completed building has then to meet the test in the place where it stands; it must find or create a demand for its accommodations, or it must fail. It cannot move to a new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Schedule for the Structural Steel for the Empire State Building, giving dates of information and drawings required from the architects, mill orders, shop drawings, steel delivery and steel erection

market; only at great expense, if at all, can it be altered to a more marketable type, and even greater expense may be involved in its demolition if a new start is to be made. Location, use, character of space and time of building must be decided right the first time, and in these decisions the architect collaborates,—he does not control.

The heavy black pencil, long hair and a temperamental disposition might expect consideration in the study of the "design," but as Mr. Harmon laments in other pages of this issue of THE FORUM, even here the architect is beset with "influences." The owner and his practical advisers must test and pass upon the plan and its functioning; finance dictates the fenestration; rent rolls rule the "parti." The engineers, the builder and the Building Department impose material limitations affecting color and texture, while the zoning law and the budget cast their shadows over form and mass,—ancient domains of my Lord Architect—now jointly occupied by him and his allies in the name of Coöperation.

Specifications, if wisely prepared, express the consensus of opinion and experience of the architect, the builder, the engineers, and the owner. They govern the work in the field, not adversely to the builder in a contest between him and the owner, but instead as a record set up by the architect of the agreement between them. Banking arrangements, mortgage records, selling negotiations or leases may be based upon the architect's specifications, no longer a weapon of offense, but instead the basis of an amicable arrangement.

The execution of the work is a task requiring management of men and materials through the skill and resources of the builder and his subcontractors working together in carrying out a schedule governing the advance and completion of the work. The preparation of this schedule must be based upon the collaboration of builder and architect, not alone as to its relation to the

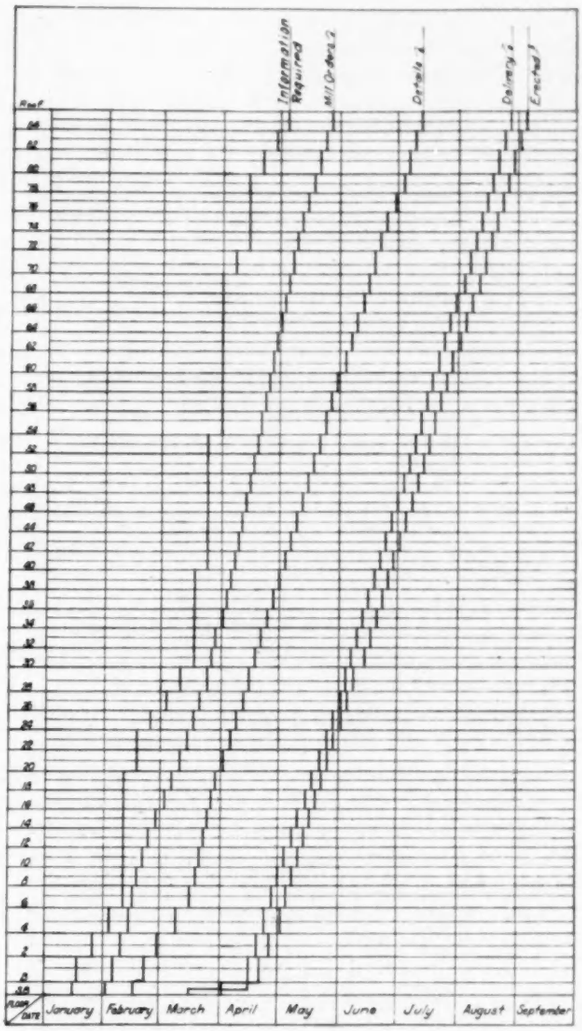


Chart developed from that on the opposite page, by H. G. Balcom, Consulting Engineer, working with the architects, Shreve, Lamb & Harmon, to visualize the time-co-ördination required in connection with the designing, detailing and erection of the structural steel

work at the site but more particularly as to timing the preparation of information in the office of the architect well in advance of the need of it in the field. With such a schedule maintained, time is saved, confusion is avoided, expense is reduced for the owner as well as for the architect, and the "expediter" customarily appointed to harass the architect's office may be put to work calculating the bonus to be gained by completion in advance of the agreed date.

There is one other traditional task of the architect which may be done away with, and that is his job as policeman. There is no good reason why the builder should always be pointed out as the villain, nor is it true that the architect is always called upon to rescue the heroine. A building operation need not and should not be a tug-of-war, suspicion is not preferable to mutual confidence, and respect; sincerity and honesty may be attributes of the builder as well and not virtues deemed to be lodged only in the soul of the designer.

* * *

The group engaged in such an important operation should constitute a Board of Directors upon which should sit the owner supported by his bankers and real estate agents, the architect in company with his structural and mechanical engineers, and the builder whose subcontracting and material supply associates from time to time assist in the discussion of special problems.

It is under such direction that the Empire State Building is being designed and constructed. From the inception of the project the architects, Shreve, Lamb & Harmon, have worked closely with Former-Governor Alfred E. Smith, the president of the owner corporation, Empire State, Inc., and more directly with Robert C. Brown, vice-president and executive director of the owner's interests in this building. In the choice of the builders there was no competitive bidding, but Starrett Brothers were chosen by direct selec-

tion after a number of the more important general contractors had conferred with the Directors of Empire State, Inc., and the architects and lawyers sitting with them as their advisers in the several conferences. Consulting engineers have been selected by the architects, with the approval of the owners: Homer G. Balcom, designing the structural steel and foundations; Meyer, Strong & Jones for the heating and ventilating, the electrical work and the elevators; and F. J. Brutschy on the plumbing.

The interests of the mortgagee, in so far as they are related to the plans and specifications, are cared for by the office of D. Everett Waid, to whom documents governing the execution of the work are submitted for approval on behalf of the loaning company.

Inspection at the site is primarily the duty of the builders' representatives, aided by supervisory visits of the architects; but there is also a special inspection of steel maintained by the architects. There are a Clerk of the Works and his assistants representing the owners and bankers, and a representative of Mr. Waid's office acting for the Metropolitan Life Insurance Company.

Regularly, weekly and often several times a week, meetings are held at the architects' office dealing with the progress of the work, questions of design and construction, or policies of job management. Such a meeting of the owner. architects, builder and engineers, was held in November, 1929, when the sketches for the building were being set up. Demolition of buildings on the site was proceeding, and a program had to be prepared for placing foundations in February and setting steel in March, four months being allowed for the completion of architects' information, the preparation of steel designs by the engineers, the bidding and award of contract for the steel, and the fabrication, delivery, and placing of the first structural shapes. Only the most careful planning and thorough coöperation made this result possible.

It is intended to use on the exterior of the building a large quantity of chrome-nickel steel. Consideration of this construction feature involved the determination of the length and width of sheets which could be rolled and fabricated; the possibility of forming the sheet on the brake; the method of jointing and of bracing; the relation of the metal form to the exterior wall surfaces, the window heads, sills and jambs, and the spandrel; the means for attaching the metal form to the frame of the structure, as well as the finish and durability of the bright surface. Neither architects, builders nor subcontractors felt competent to deal with this complicated technical problem of construction without full consultation. Accordingly, after full preliminary discussion, an all-inclusive meeting was called, which was attended by representatives of the owner, the architects and builders, the subcontractors rolling the material, the metal workers who were to fabricate and those who were to erect it, and the inspectors who were to test all sheets at the several stages of preparation. This conference made possible decisions based on instant comparison of recommendations and the establishment of the responsibilities of all those involved. With the method of procedure set up and the tasks of each group defined, orderly and sound execution of the work became assured.

Decisions affecting the elevators required similar important meetings of the owner, architects, builders, and the engineers with the elevator manufacturers. A program never before attempted was under discussion,—a larger elevator installation, greater car sizes, heavier loads, higher speeds and longer travel, than any previously known had to be set up, designed and made possible of installation in a relatively short time. Steel design, foundations, hatchways, clearances and electric service were involved, and the coördination of every agency participating was essential to success. From the program developed through this series of conferences the Otis Elevator Company is now building and will install elevator equipment, which without the collaboration of the several groups in authority would not have been possible of completion in the time allotted for the execution of this work.

After the architects had completed their advanced preliminary drawings for the great building project, an outline specification was set up establishing the methods of construction and the selection and disposition of materials. This information was submitted to the builders, as well as to the owners, for detailed comment. Conclusions reached from this collaboration have governed the full development of the working documents, the letting of contracts, and the schedule controlling the execution of the work.

It is true in the building industry as elsewhere that "the sceptre falls to the hand that can hold it." Recognition of this principle does not belittle the architect or lessen his influence,—on the contrary, it brings him into a correct relation to those with whom he is working, places responsibility and authority where they belong, and strengthens the position of each man in the work for which he is responsible. Through such a relation the architect should do better work, inspire greater confidence and acquire greater prestige, not alone in his own profession, but—and this would seem of greater importance—in the building industry as a whole.

DESIGNING MODERN OFFICE BUILDING

BY

ALBERT KAHN

ARCHITECT

THE office building of today is a typical development of the times. Its plan and design require familiarity with the demands of modern business for efficient, comfortable space capable of highly flexible sub-division. The average office space provided by many buildings of the past is no longer acceptable, as is proved by the large number of offices only a few years old, but already obsolete and deserted because of newer and better planned structures. It behooves the architect, therefore, to plan so as to meet the requirements of many years to come.

The problems involved in the solution of the modern office building are many and require not only careful consideration of plan and design, of construction, of mechanical equipment, and familiarity with land values, but also judgment on the part of the designers as to the desirability of location and the possible returns on the investment. In other words, the architect in charge is expected to be a sort of combination of trained designer, engineer, realtor, financier, and building manager.

SITE. The location has much to do with the success of an office building. Land with at least three exposures is preferable to that with only two, since this allows of a proportionately larger rentable floor area. Inside lots generally present a more difficult problem. The width of the property, especially, has an important bearing on its development. Prospective builders would therefore do well if before purchasing they would consult their architects and even have tentative sketches prepared to determine what percentage of rentable floor area is possible for the site.

Courts, where necessary, reduce the occupiable area and consequently the rentable space. In court buildings a rentable net area of 50 per cent of the lot area is rarely exceeded. On smaller lots, where courts are not required, this rentable area may be increased to more nearly 70 per cent. One thing definitely established is that the importance and rental value of a structure increase with its size. Tenants as a rule prefer offices in a large and outstanding building where great numbers are housed under one roof.

The exposure has much to do with the desirability of the site. North light is generally preferred by tenants, and next to this comes east light. While as a rule the site is chosen because of its particular location, it is well to caution property owners about looking into soil conditions before purchasing, especially when several sites are under consideration. Excessive cost of foundation work may be saved thereby.

PLAN. In the planning of the office building, there are generally possible several solutions. Every effort will naturally be made to develop maximum rental area. At that, careful consideration must be given to the advisability of smaller but more desirable office spaces.

Modern practice tends toward shallower offices. Whereas, until recently, 26 to 28 feet was considered none too deep, offices of a maximum depth of 20 feet now prove to be in greater demand. Where offices face inner courts, they are best made not to exceed 16 feet in depth. As to their width, the generally accepted plan provides from 16 feet, 6 inches to 17 feet between centers of dividing partitions. This allows division of the space into two 8-foot offices. A very practical arrangement is a plan permitting widths of 16 feet, 6 inches alternating with 12-foot widths. This satisfies the large demand for small offices so common, especially in the best buildings.

In planning the corridors it is more economical to have them serve offices at both sides than offices only on one side. Corridors when fairly long should be not less than 7 feet in width. The entrance doors to offices should preferably be not opposite one another, but rather staggered, and placed not in the center of the office space but to one side. Office entrance doors should not be less than 3 feet, 4 inches wide, to permit of taking in desks and other furniture. Intercommunicating doors may be less in width. The side lights in corridors so generally used a few years ago are today done away with. It has been proved that they add but little light and that their extra initial cost and upkeep expense are unwarranted.

In many cases, it is found desirable to leave the office space quite clear of partitions, subdividing them later to meet the requirements of tenants. On the other hand, in some cases the space is divided and changes are made later if required. Many building managers believe the latter plan the better, in that even with the neces-

sary changes, the ultimate cost of taking care of tenants is less than that of subdividing later.

The occupancy of the ground and lower floors usually determines their plan. If the ground floor is to be divided into smaller spaces, a central office entrance may be used. If, on the other hand, a large banking or other institution is to occupy one of the lower floors, the office entrance may best be placed at one side. The center entrance usually means the location of elevators at the center of the building, which often proves an objection to the housing of a corporation requiring large and unobstructed space.

Buildings of large dimensions at the base, also those designed to conform to set-back requirements, frequently necessitate deeper areas in their lower stories. Such are often desirable for concerns where space for files, vaults, etc., is necessary and where they may be grouped in the center of the floors. In the Maccabees' Building in Detroit, for instance, the society occupies the four lower floors. It uses practically the entire area of the property. File and record rooms, vaults, reception rooms, etc., occupy the central space, while private offices facing the streets surround them. Above the fourth floor the building recedes for the typical office depth. The area of such deeper space should be carefully considered, for unless it can be used for specific purposes, it will be unrentable. Where shops are to occupy the lower floors, an adequate receiving room is essential and must be provided, either on the ground floor or in the basement. In locating the office windows, it is always best to have two per bay. This permits of easy subdivision.

COLUMN SPACINGS. On at least the typical office floors, columns are best placed in the corridor partitions. On the lower floors, it often proves advisable from a rental point of view to reduce the number of columns, even though this requires extra steel girders and more costly construction.

HEIGHT OF BUILDING. As for the heights of the respective floors, that for the lower stories must depend upon their occupancy. For the office floors proper, a clear height of 10 feet is ample. In many of the newer structures, even 9 feet, 6 inches has proved satisfactory. An extra floor is often made possible by this lesser height, especially when city codes limit the height of buildings. As to the economical limit for the height of buildings, this is a much mooted point. There is a certain advertising value in a building's being the highest structure of the town, though as a rule it remains the highest only until some one erects a taller building. A thoroughly practical decision can be arrived at only upon careful study of the problem and upon computation of costs and possible returns. The additional elevator space required on all floors must not be lost sight of.

MAIN ENTRANCE LOBBY. Its design and location are of prime importance. Here there are established the quality and standards of the building, and its appeal and effect contribute in a large measure to the success of the building. It should be as spacious as the plan will permit and must bear a definite relation to the traffic.

Placing of shops off an arcaded form of corridor, especially when entrances are to be had from several streets, is often desirable, adding greatly to the rental returns of the building. The main corridor of the Fisher Building is 24 feet in width. It has shops along one wall, and on the opposite wall there are display windows for the use of the shops on the second and third floors. An important stairway to the second floor, and especially to the basement, is often desirable. This, however, is determined by the type of occupancy. In many structures, the stairways serve merely for intercommunication between floors, and they are treated as simply as possible.

ELEVATORS. Particularly important to the ultimate success of the building are the number, type and location of the elevators. Marked advances have been made in recent years in elevator machinery, safety appliances, door operating mechanism, etc. The best equipment is necessary in the modern building. The great height to which we build is made possible only through the development and perfection of the modern elevator, and to economize here is bound to prove a serious mistake. Determining the number of elevators required is a matter needing careful computation. Modern practice demands that the departing interval for each group be not greater than 25 seconds, this in some instances being reduced to 20 seconds. The character of occupancy must be considered in deciding on the required number of cars to provide such intervals, as must also be the height of the building, the loading and unloading time. No rule of square foot area can determine the number of cars required. Every building presents its own problem and must be independently analyzed.

The system of placing elevators in pockets or alcoves, grouping them for local as well as express service has proved very practical. A bank of six elevators is preferable to a bank of greater number. Naturally, elevators are best placed where they sacrifice the least amount of exterior wall space with outside light. Windows in elevator shafts are undesirable, nor need shafts be plastered or otherwise finished, because closed cars are now much used. It is generally conceded that no matter what may be the size of the building, elevators are best grouped rather than placed at different points. This does not mean that special groups for special purposes are not

to be placed where most convenient for the quarters they are to serve. Building managers as a rule prefer solid, rather than glazed doors for elevator entrances. One or more elevators arranged to stop at every floor must be provided for night and Sunday service, to assist in the moving of freight after regular working hours, and as an aid to the regular freight elevator.

In a 38-story office building recently designed for Detroit, an economical elevator scheme was developed. On the ground floor, six elevators are grouped on each side of a 22-foot lobby. On the upper floors, this 22-foot space is reduced to an 8-foot corridor, the rest being utilized for stairs, toilets and other utilities. This arrangement has made possible a remarkably large net rentable floor area. In buildings of great heights, elevator speeds up to 1000 feet per minute are common. Such speed necessitates the use of the most improved type of elevators, and closed cabs to reduce the unpleasantness of high speed travel.

SERVICE ROOMS. The number and location of toilet rooms must depend upon the plan arrangement adopted. They are preferable on every floor rather than concentrated on one or a few. This saves much intercommunicating elevator service. Often men's toilets are placed on two succeeding floors, with one women's toilet on every third floor. This means one women's toilet to two men's throughout the building. The number of fixtures required is determined by the codes in the respective cities and must in any event be adequate. Outside light is desirable though not essential in toilet rooms, since they should in any case be mechanically ventilated. Toilet rooms should never open off public stairways but off main corridors. In some recent office buildings, even the wash basins have been concentrated in rooms adjoining the toilet rooms, doing as much as possible without individual basins for the different offices. It would be unwise, however, not to make provision for supplying the latter.

It is unnecessary to dwell upon the need of a sufficient number of janitors' closets of adequate size and conveniently located on every floor, and meter closets, pipe shafts, ample space for vent stacks to provide for possible future requirements, janitors' locker and toilet rooms, liberal provision for store and supply rooms, carpenter shop, paint shop, barber shop, and other conveniences required for management of important structures.

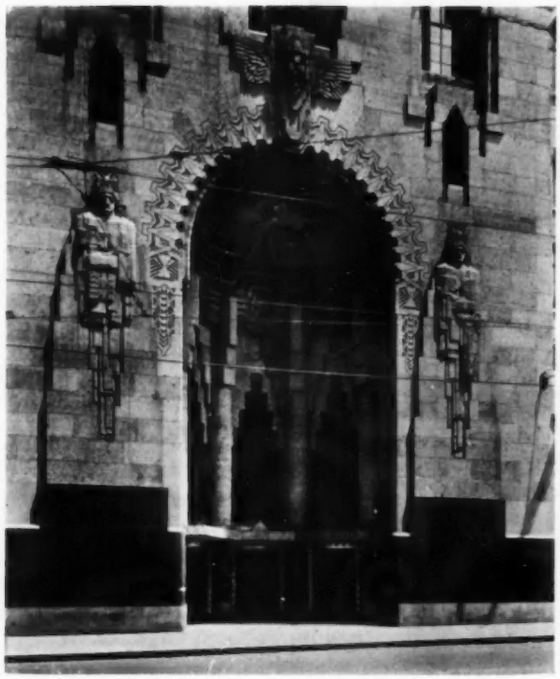
MECHANICAL EQUIPMENT. The mechanical equipment of a building, such as heat, light, telephone system, ventilation, plumbing, etc., has so much to do with the success or failure of a building that it is needless to say that only the most competent engineering skill should be enlisted. Failures in mechanical equipment may mean constant upkeep and endless expense.

FINISH. Simplicity everywhere is essential. Only materials easy of maintenance should be used. This does not mean that the finish be without character. Indeed, the closest attention to design in such details as elevator cabs, signals, trim, hardware, office directories, signs, etc., will have a strong influence on the character of the occupancy of the building. A minimum of woodwork should be used. Most corridors should have marble wainscots, and these are best kept practically flush with the plaster above. Marble floors are practical for corridors and terrazzo is often used. For office floors either battleship linoleum, rubber or cork tile glued directly to the cement finish are probably the best to use. Careful attention must be paid to the finish of the toilet rooms. Marble or glass is practical for wainscotings and toilet stalls, and impervious tile for the floors.

DESIGN. The modern office building seems destined to produce a typical American architectural type. Its structural functions, honestly and directly expressed, must inevitably result in a distinctive architecture. The skyscraper, having no precedent, must needs establish its own. We stand upon the threshold of a new era. Unfortunately, with the abandoning of all adherence to classicism and precedent, there is a tendency to indulge in eccentricities. This is to be regretted. Good design, as ever, must be a matter of mass, proportion, and rhythm, and of simplicity, repose, good taste in the use and disposition of ornament, and the selection of materials. Deliberate striving for the bizarre and the unusual, merely to be different, is sad. Established canons may not be violated without producing anarchy in design. The use of the uncouth and the repulsive to obtain the sensational results inevitably in artistic failure. Now, more than ever, is needed a sensible restraint by the designer.

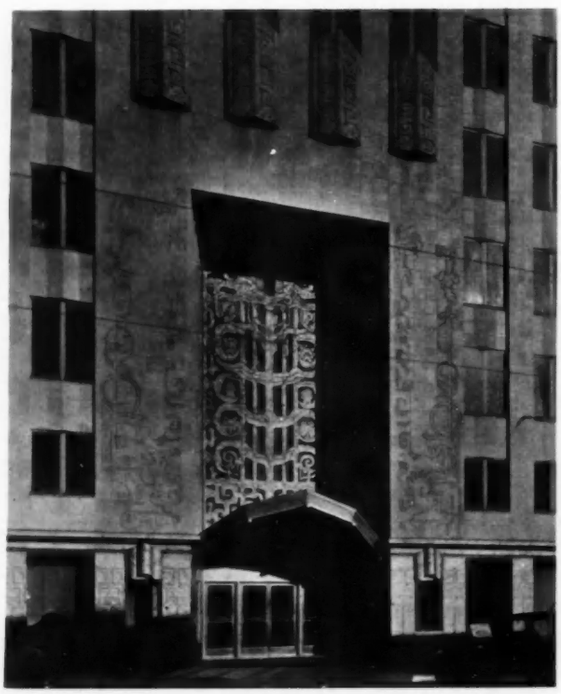
IN GENERAL. An article on the planning of the modern office building would be incomplete without calling attention to the desirability, in many cities at least, of providing garage space for the tenants' cars. By taking care of this need, some of the most recent structures have proved successful in renting space when others built at the same time have been slow in gaining tenants.

Another matter well worth bringing to the attention of the designer of the modern office building is the service rendered by the National Association of Building Owners and Managers. This is invaluable in procuring the best possible results. The society appoints a group of experienced men to carefully consider from all angles the architect's proposed plan. By their method there is obtained, not merely the opinion of one expert, but that of a number of men, each of whom expresses himself freely on essential points and in view of his particular experience.



Griswold Street Entrance
Union Trust Company Building, Detroit
Smith, Hinchman & Grylls, Architects

Main Entrance
Ohio Bell Telephone Company Building, Akron
Mills, Rhines, Bellman & Nordhoff, Architects



Entrance in Stone and Metal
Four-fifty Sutter Building, San Francisco
S. R. Miller & T. L. Pflueger, Architects

Marble and Metal in Lobby
The Integrity Building, Philadelphia
Green & Lavelle, Architects

DESIGN IN OFFICE BUILDINGS

BY
HARVEY WILEY CORBETT
CORBETT, HARRISON AND MAC MURRAY, ARCHITECTS
NEW YORK

IN their lines, their masses, their proportions, many of the new office buildings are excellently designed. But much thought might well be devoted to the possibilities of developing new materials for walls, and to a wider and more coherent use of color. Color, of course, should not be applied in squares and bands (like an afterthought as it were); color should be employed as an inherent part of the building's design. Perhaps it may eventually prove more satisfactory to have buildings of a neutral shade by day, flooded with harmonizing hues by night. It is not at all inconceivable that the future may bring a substance for walls that admits sunlight but while permitting those on the inside to see out does not allow those on the outside to see in, a substance that by day may be of a hue which dirt will not seem to affect, and that by night will scintillate with colors projected by electric lamps.

Finally, the office building of the future, with one or more city squares for its base, may well be an office building only in part. These buildings may carry to its logical conclusion our present tendency to distribute urban populations vertically. They would then be planned in layers. The present sidewalks would be raised above the street level, thus increasing the traffic capacity of the street and separating pedestrians from motors. From the sidewalk to the first set-back would be office space for business. The first set-back would have a constant cornice line which would be a second sidewalk; on this level, where people could move conveniently about on their errands, would be retail shops. Rising from this district would be a residence tower orientated to receive the maximum of sunshine for its inhabitants, and containing promenades and terraces amid fresh air and sunshine. The dark cores of the buildings would hold elevators and provisions for such forms of indoor recreation as theaters, gymnasiums, and swimming pools, for which artificial light suffices. In such buildings the residents would have concentrated for their convenience the facilities they need most.

THE TREND OF OFFICE BUILDING DEVELOPMENT

BY
ATLEE B. AYRES
ATLEE B. AYRES, ROBERT M. AYRES, ARCHITECTS
SAN ANTONIO

ONE of the most serious problems that have to be taken into consideration today with our multi-storied buildings, and one that requires much careful thought, is that of providing a satisfactory means of rapid exit from the building. Smoke-proof stairways and fire escapes are all right for six- and eight-story buildings, but for higher structures some other type of exit will have to be developed, so that people may reach the street level as quickly as possible. A press report that was published recently said that a test made in the Woolworth Building in New York regarding time required to descend from the top story of the building to the street level, clearly demonstrated the impracticability of stairs of any character being used to empty the building in case of panic. A satisfactory chute type of exit might be developed that would be feasible, which would get the occupants out of the building in a safer and more rapid manner.

Regarding the use of color on the exterior of our buildings, there is no reason why a certain amount of bright, clear color, if used in harmonious combinations, could not be used in both the lower and the uppermost stories in a successful way in order to give more individuality to our designs. Color notes are very often lost by selecting some mixed colored pattern which is very pleasing at short range, but when it is in the building and seen from a distance, the color effect is lost. Therefore, when colors are used, they should be in bold, large, concentrated masses so that they will not lose the color effect. A practical method for deciding on the selection of colors is to have a cardboard panel prepared in color and placed at a high point to study the effect.

It is to be hoped that the past efforts toward originality in design, and the methods of borrowing from the past are evolving a new form of expression in the architecture of America. There is no country in the world today that has made such a wonderful stride in design and construction in buildings of every character as are seen in the United States.

THE DEVELOPMENT OF THE OFFICE BUILDING SINCE 1924

BY

THOMAS E. TALLMADGE

TALLMADGE & WATSON, ARCHITECTS, CHICAGO

WE have had skyscrapers for 44 years,—so long that the Tacoma Building of sacred memory and many others wore the habiliments of the Romanesque Revival. Before 1924, the opinion of all of our European critics and of the majority of the citizenry was that the skyscraper was hideous; at best it was regarded as a commercial necessity, a working part of the vast mechanism of American business. The taste of McKim, the grandeur of Burnham did little for them, and the pleadings and the sarcasm of Louis Sullivan fell on deaf and scornful ears. One discouraging feature was the fiasco that the Beaux Arts men made of the skyscraper. *Les diplomes* were young, they were well educated, and they certainly were not lacking in self assurance; but all the cartouches and all the consoles in the ateliers couldn't redeem the skyscraper. Something might perhaps be done with the Gothic, we thought, but after all, as Burnham said, "you can't improve on the Romans." To the New York Brahmins, the evolution of new forms or new ornament to meet this new condition was a joke, the uncouth ravings of the wild and woolly West.

Architectural Photo Co.

Tacoma Building, Chicago, Ill.
Holabird & Roche, Architects

Events came, much too rapidly. They were, first, the World War. That destroyed our illusions and our reverence (especially for dogma). Second, the New York Zoning Law of 1916 gave us the setbacks; and, third, the *Chicago Tribune* competition of 1922, with its gift of the Saarinen second prize design, presented us with a symposium of the world's best thought and an inspired solution. The Decorative Arts Exposition of 1925 cannot be ignored. For better or worse, a wealth of new detail which we had not the time, patience and ingenuity to evolve, was laid at our doors.

Architecture today is in the same position as painting in the sixteenth century. It is an integral part of modern life. Its cathedrals are its skyscrapers. The ecstasy of an Abbe Suger standing in his new choir of St. Denis is akin to the pride of the magnate or thrill of the stenographer as they raise their eyes from the maelstrom of the street to those unbelievable heights scaled by man's genius, and paraphrase the prophet by saying, "What hath man wrought!"

The re-birth of the skyscraper came in the complete abolition of the cornice and excrescent detail. Classic columns, chased out of New York's thoroughfares, are reported to have taken a final refuge on the top story of the New York Central Building, where they hang by the skin of their acanthus leaves. The unprecedented forms that the skyscraper has taken are so lovely, as witness in the proposed Empire State Building in New York, that we have no reason or desire to look immediately for further change.

This seems to indicate that the skyscraper of the immediate future will discard solidity for lightness and sobriety for gaiety. Instead of the rocky cliff pressing on the earth, it will be the sunbeam or the rainbow, hardly touching the ground. Beautiful in its color and strength, in the rays of the mid-day sun, with nightfall it will be a disembodied spirit, glowing and flashing in the flooded light of its myriad reflectors.

THE TREND OF MODERN COMMERCIAL ARCHITECTURE

BY

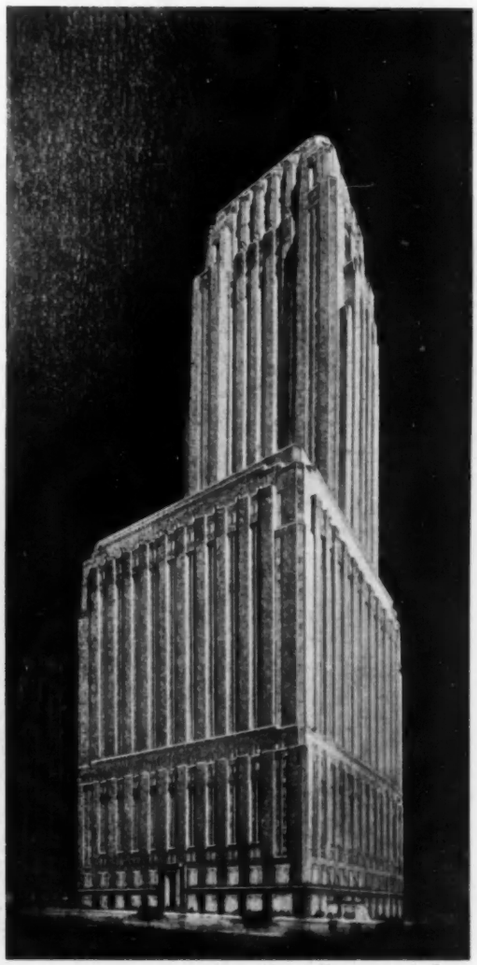
H. J. B. HOSKINS

OF HOLABIRD & ROOT, ARCHITECTS, CHICAGO

MATERIALS and methods of application offer a field for intensive study, and the increasing number of new discoveries has to be met with changing ideas as to their use. It is more than likely that the building trades as we know them today will become changed from their present form to a considerable degree. Since the introduction of steel there has been a slow but persistent tendency toward the elimination of the work of the masonry trades, at least above ground. This will undoubtedly continue, and will probably include plastering and other items.

Buildings will tend to become lighter in construction. They will be fabricated in shops with parts delivered ready to be assembled in place rather than built. Floor slabs having sheet steel decks with any finish desired on top, reinforced and fireproofed below, and built-in conduits and other utilities may be delivered in sections, hoisted and welded in place. Possibly this idea may be applied to enclosing walls through the use of unit slabs, containing windows, conduits, steam piping and all the mechanical requirements arranged for standardized service, completely finished inside and out.

An exterior may be of rustless metal, possessing possibly a porcelain enamel finish, or a sprayed-on coat of paint material yet to be discovered. The inside of these wall slabs would in all probability be finished to match the interior sectional partitions and present surfaces of wood veneer, or paint of varying characteristics and beauty, eliminating the troublesome problem of what to do with wet plaster. The fireproofing of steelwork may be entirely of asbestos block, or a similar substance applied over rust-proof paint. These considerations may permit of the erection of structures free from the influence of weather conditions, capable of precise fabrication and assembling within the limits of the most exacting of time schedules.



Photos Henry Fuermann & Sons

First Section as Built — Perspective of Proposed Structure

Michigan Square Building, Chicago, Holabird & Root, Architects

VERTICAL OR HORIZONTAL DESIGN?

BY
JOHN MEAD HOWELLS
NEW YORK

IN designing a skyscraper I believe in a composition of verticals, because by "skyscraper" I mean a building several times as high as it is wide. But I also believe in a composition of horizontal bands for long, low stores or apartment houses, as they are built in Holland and Germany.

For a tall building the simple composition of verticals, which some like to call modernistic, seems to me "indicated," as the doctors say, for the design of steel cage buildings. It is the simplest and most straightforward clothing in masonry of the steel cage itself, for several reasons.

First, the verticals are accentuated just as in the steel cage. The vertical members persist. The emphasis is definitely on them, while the horizontal members are built in between them.

Second, the grouping of vertical lines holds the windows in place naturally in the composition, instead of resorting to the old fashion of piercing a flat wall with windows, as a waffle iron is pierced with squares.

Third, the verticals can terminate naturally against the sky, as they reach their various zoning levels, in the same way that a growth of pine trees or a palisade or cliff ends against the sky.

How unnatural was the old straining for horizontal bands and for heavy cornices far up in the air where they could serve no purpose other than that of obstructing the light! How fortunate to leave behind us the belief that a vertical skyscraper must somehow be made to look like a horizontal Farnese Palace! It is as impossible as the problem of that charming woman in Miss Hyatt's book, who wrote to the paper: "I am a small brunette. What shall I eat, and what exercises shall I take to make me appear a large blonde?" Also, it is a pleasure in itself to design in this simple new manner, which is not yet a "style" nor yet out of a book.

I have believed for many years in designing tall buildings without horizontals, as is shown by the accompanying view of Howells & Stokes' Trinity Tower of 1913. The Panhellenic Tower of 1928 shows the vertical idea better developed, although not an office building, and the *Daily News* Building just completed on 42nd Street, by Raymond M. Hood and myself, is an extreme case of verticality reduced to a simple expression, shown on Plate 139, page 791.

Trinity Tower, New York, 1913. Howells & Stokes, Architects

Panhellenic Tower, New York, 1928. John Mead Howells, Architect

THE ATTITUDE TOWARD THE DESIGN

BY
IRVING K. POND
POND & POND, MARTIN AND LLOYD, ARCHITECTS
CHICAGO

THE appreciation of art calls for the exercise of certain faculties of the mind; for repose, for contemplation, for a sympathetic study of the parts and their synthetic up-building into the whole. The appreciation of art depends upon a leisurely human attitude toward life and environment such as is not customarily associated with business. There is an art side to business as there is to science and mathematics.

There is at present a tendency toward over-elaboration in office building design, a tending to ignore the charm of dignified simplicity and to overlook its psychological effect, this perhaps more internally than externally, but evidenced throughout. It is of no especial advantage to the individual tenant of a building rented for numerous businesses or types of business or professions to enter his particular office space through an elaborately designed public vestibule, lobby and elevator car. The over-elaboration of the public spaces, if noted, would tend to bring the under-elaborated individual space into violent contrast.

The economic phase is in evidence here. Standards of living are getting higher, and this only in the money sense. This rapid pace is not bettering our morals nor enhancing our love of beauty or our appreciation of art which is a love of beauty symbolized and translated into material forms. The rapid pace is causing us to strive to earn more to expend upon that which is intrinsically worthless.

Design which transcends urbanity is not only undesirable but shocking to the social sense. Each one owes it to society to make the product of his labor compatible with society's truest aims, its highest ideals. But he vulgarizes society who indulges in the bizarre and over-wrought. The commonplace and the conventional will not meet society's truest aims. Newness and variety tempered with restraint and guided by wisdom will touch a sympathetic chord in a well ordered social system and will go far toward moulding it.

The Royal Neighbors of America Supreme Office Building, Rock Island, Ill.
Pond & Pond, Martin and Lloyd, Architects

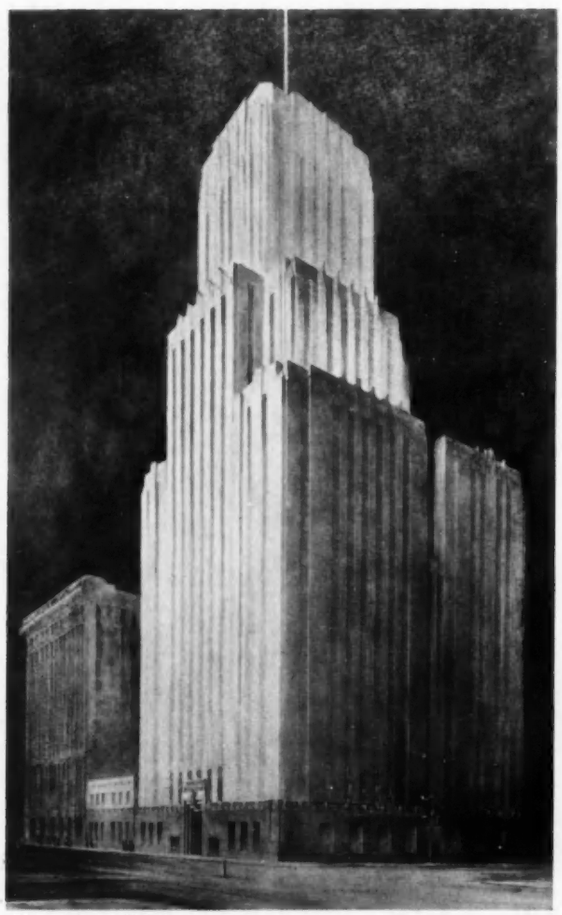
THE BASIS OF DESIGN PROGRESS

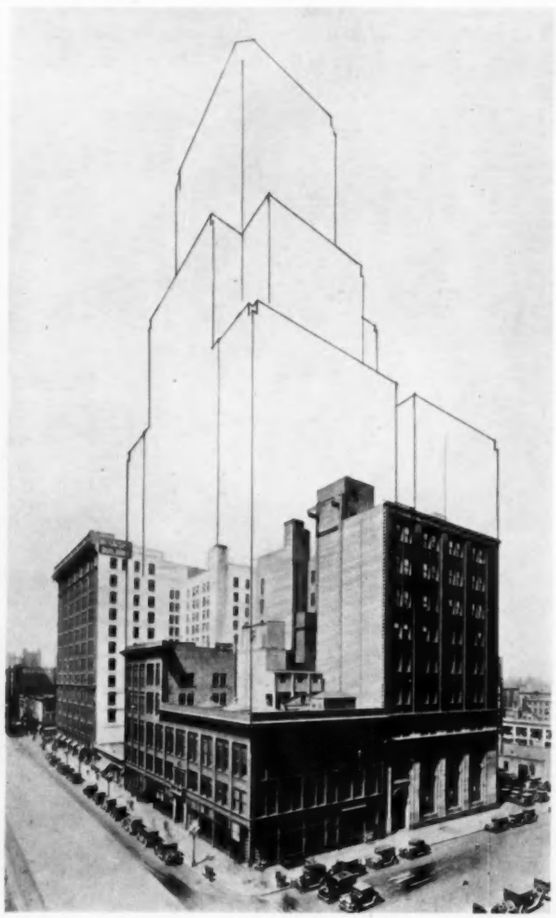
BY
EDWIN HAWLEY HEWITT
HEWITT & BROWN, ARCHITECTS, INC., MINNEAPOLIS

SURELY the public is becoming trained or educated to appreciate form, color and line. There is evidence on every hand that such is the case. To be sure, the public has its blind side. It is altogether too complacent about many other ugly sides of our civic development. There has been constant stimulation to research, and the inventive abilities of the American people have provided ways and means of rendering these buildings safer, the capital investment more stable, and the structures more beautiful. It has become a real and a most important task to the architect to follow up conscientiously the result of all these researches and investigations, so bewildering in number,—new uses of electricity in power and lighting; new uses for glass, and better manufacture; new alloys of metal,—improvements all along the line.

Continued progress will depend not only on the ability of our architects to think clearly; they must have the saving common sense to make haste slowly, while consolidating and maturing all along the line. The sheer mass and monumental quality inherent in the bulk and height of these buildings have endless stimulation for designers.

I have left to the last a reference to the plan, which obviously is basic. The architect starts to plan as soon as he becomes aware of the economic conditions to be met, the site to be handled, the use to which the building will be put. What I mean by the plan, however, is more comprehensive than this. The plan will really determine the scope of his ideas, and whether it will permit him to realize the full possibilities of his design. In other words, let the architect so plan and compose his building that it is consistent throughout, and not an assemblage of ill-related parts. Totality of impression can be achieved only by complete planning from the inside out and not vice versa.





Photos A. E. Kairies

Northwestern Bell Telephone Co., Minneapolis
Hewitt & Brown, Architects

CIVILIZED ARCHITECTURE

BY

ELY JACQUES KAHN

THE FIRM OF ELY JACQUES KAHN, ARCHITECTS
NEW YORK

THE architectural characteristics which are indicative of our time are the rapid development within a few years of the plan, character and quality of large buildings. In general, these are found in the greater usability of the plan and its adaptability to other and profitable changes in occupancy; in improved and more suitable general service which is conducive to the health and comfort of the occupants, the most important of which is adequate elevator equipment; and in the use of better, more durable and attractive structural materials such as impervious, self-cleaning brick, polished granite, stone, and rare marbles. Larger rather than small buildings are inevitable in large urban centers,—they are more economical. The invention of a non-explosive motor fuel will allow the parking of all motor cars within the building, and provisions will be made for handling all freight and merchandise within buildings, removing the present sidewalk and street obstruction and traffic congestion. Real property will be assembled in large areas of one or more city blocks for large building units. These will be more uniform in appearance and economical in service. A keen competition and the demands of financiers will result in increased efficiency and adaptability of plan, a high standard of both external and internal appearance, and attractive lobbies and public spaces.

It is inevitable that architecture, which to the public consists principally of external appearance, will also keep step with the progress and change of plan and structure. Design is a pure derivative of function. Fenestration, depth of daylighted floor areas, courts, zoning requirements and other economic factors will control the design. After a survey of contemporary architecture throughout the country, it is obvious that this is the accepted basis of design,—it cannot be otherwise and possess the elements of progress and change. It is inconceivable that purely academic adaptations can longer be applied.

THE MODERN OFFICE BUILDING

BY

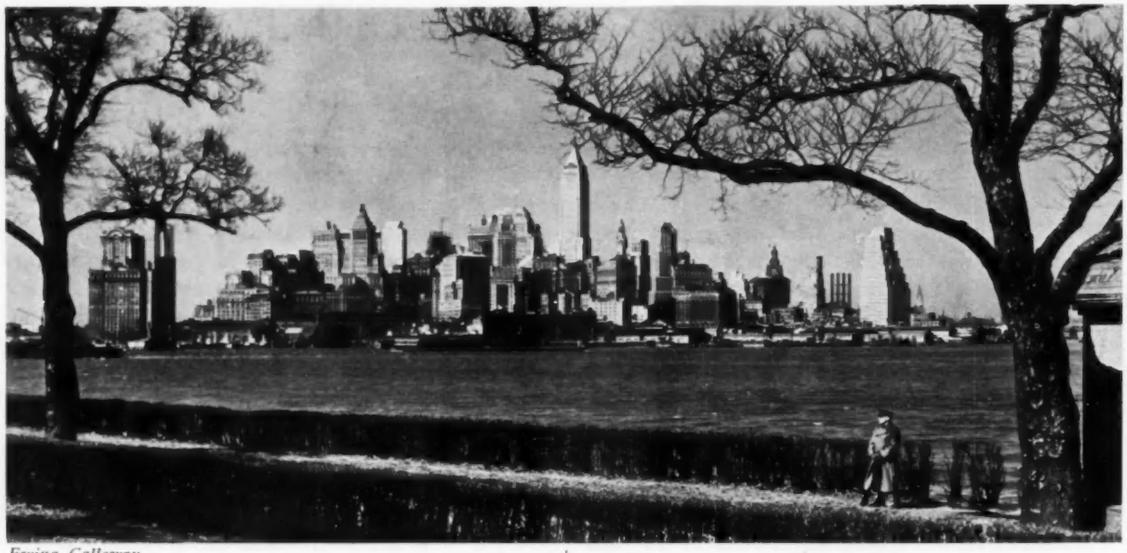
TIMOTHY L. PFLUEGER

J. R. MILLER, T. L. PFLUEGER, ARCHITECTS
SAN FRANCISCO

THE modern office building is either an investment for revenue in rental alone or it is built to house and advertise a business, in which latter case the owner often concedes a decrease in revenue for special architectural appeal. In either case the problem is practically the same. No intended contribution to beauty in design can live if it is based on a sacrifice in the enjoyment or usefulness of the interior. We no longer start out by selecting a dress of antiquated and inappropriate style with which to clothe our modern frames of steel, we still persist in using the same masonry devices or forms, and merely treat their surfaces in the "modern manner."

Until the steel men, by adding the necessary elements of stiffness, fireproofing, anti-corrosiveness and pleasing surface finish, give us steel which will allow us to put up buildings as battleships are built, we must be content to use masonry walls and floors in conjunction with steel.

We should build our structures as homogeneously as possible, making the walls an integral part with the steel frame, not a "dead," inactive load or encumbrance, but a living resistant to earthquake and wind stresses. Our materials interior or exterior, should be integral in the structure,—surface treatment of the structural mass rather than loose applications of finish,—a living skin, as it were, over the flesh and bones, not clothes, whose styles change rapidly and must be frequently renewed and expensively maintained. We buy our surface materials only for their skin. The most suitable masonry facings from the standpoint of cleanliness and maintenance are those having a glossy surface, at present either ceramic or polished stone. But we are beginning to recognize glass as an asset, and to develop a mass in which the glass takes form.



Ewing Galloway

THE SPIRES OF GOTHAM

BY

KENNETH M. MURCHISON

THE one thing in the mind of every foreigner on his first visit to our shores is New York's skyline. They rave over it, they hurl carefully worked-up rhetoric in its direction, they beat their breasts and exclaim that there is nothing in the world like it! All of which makes Chicago exceeding wroth. Chicago is sore anyhow, because it's not on the seacoast and therefore can't get a first-hand impression.

Outside of a few hotels uptown, all our lofty spires are designed for commercial uses, for the garnisheeing of money from the masses and for the accommodation of the frenzied business men who want to be either in the Wall Street district or in the Grand Central zone.

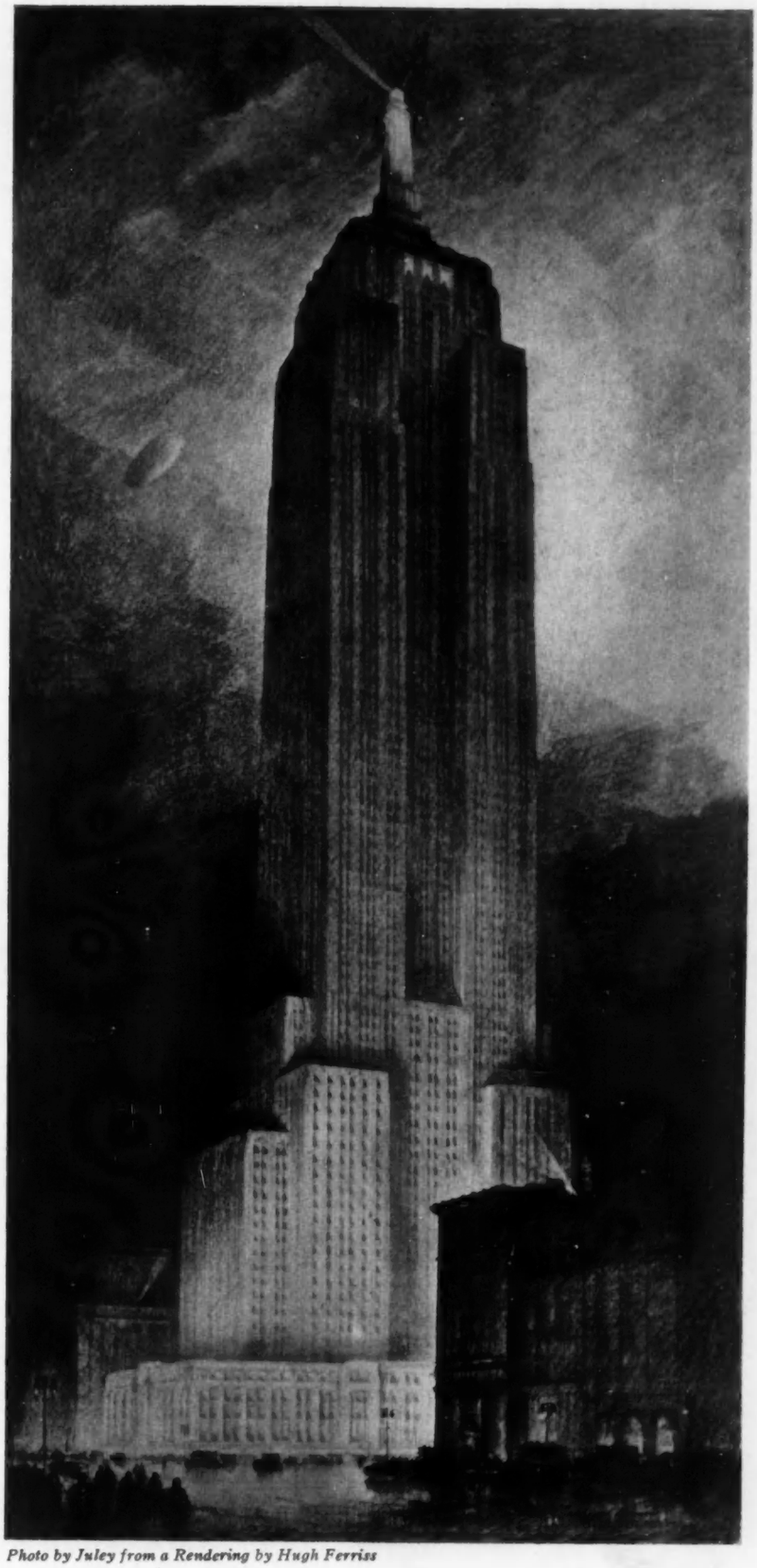
There was a time when the Standard Oil Building and the Bankers Trust Company edifices were outstanding ones. Now the Bank of the Manhattan Trust Company rears its seventy-odd stories a few furlongs further aloft than anything else downtown and only a short time ago a new one was announced for Wall Street, a little pee-wee to contain one hundred and five stories. We will believe this Grimm's Fairy Tale when we see it up, for it is projected for the corner of straight Wall and crooked Pearl Street, down in the district where the smell of roasting coffee permeates the noonday traffic and where tarred rope may be readily bought; where lousy mariners sign up ships' articles for out Australia way and where the sugar brokers bewail the low price of that commodity down in the Antilles.

What is the matter with our office buildings? Nothing, my dear sir, absolutely nothing. They are coming along in fine shape and soon we will have a good one. They are getting more window space and less ornament; more ventilation and less dirt; more elevators at a reasonably fast speed and more rents and less vacancies.

It does not seem to me that the elevator people have made the progress they should have made. True, they can go faster, but so can a mine hoist. The cars are flossier but so are Simmons beds. They operate themselves by push buttons but they have been doing that in Paris for years (and at about 25 per cent of New York prices, too). No great genius has come out, however, with something revolutionary in the way of an entirely new system of vertical transportation. No doubt many have tried a vertical moving sidewalk but as no one ever put over a success in a horizontal moving sidewalk they have all given up the vertical idea without a struggle.

Two or three cars in one shaft has often been suggested but we understand that the Otis Company does not want to try it out in real life. In one of the new Wall Street projects the architects stated that they were going to try out a double-decked car, although to my mind it would

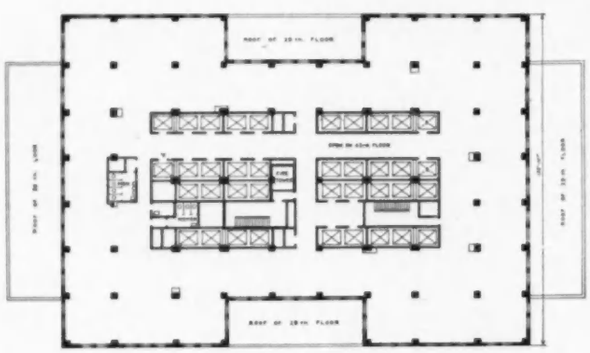
(*Concluded on page* 878)



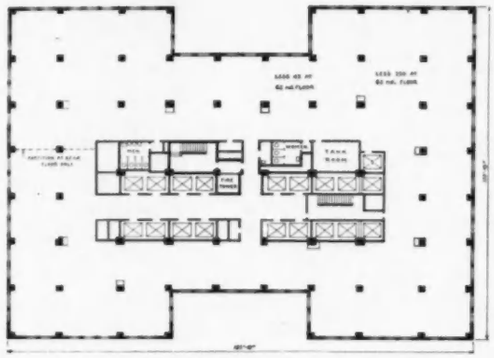
EMPIRE STATE BUILDING, NEW YORK. SHREVE, LAMB & HARMON, ARCHS.

Photo by Juley from a Rendering by Hugh Ferriss

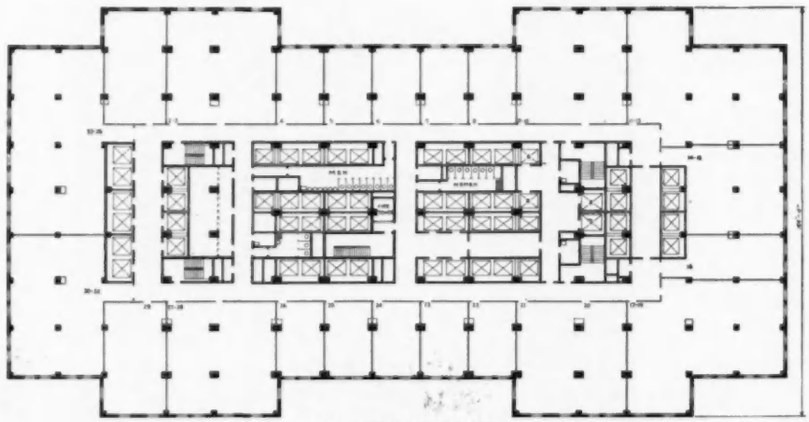
UNIV. OF MICH.



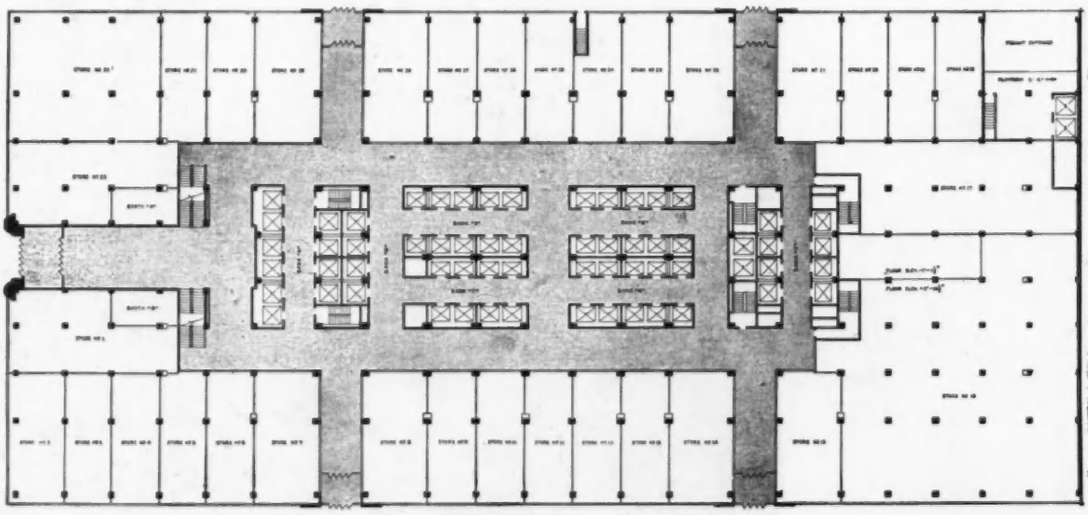
30TH FLOOR PLAN



61ST FLOOR PLAN



7TH FLOOR PLAN

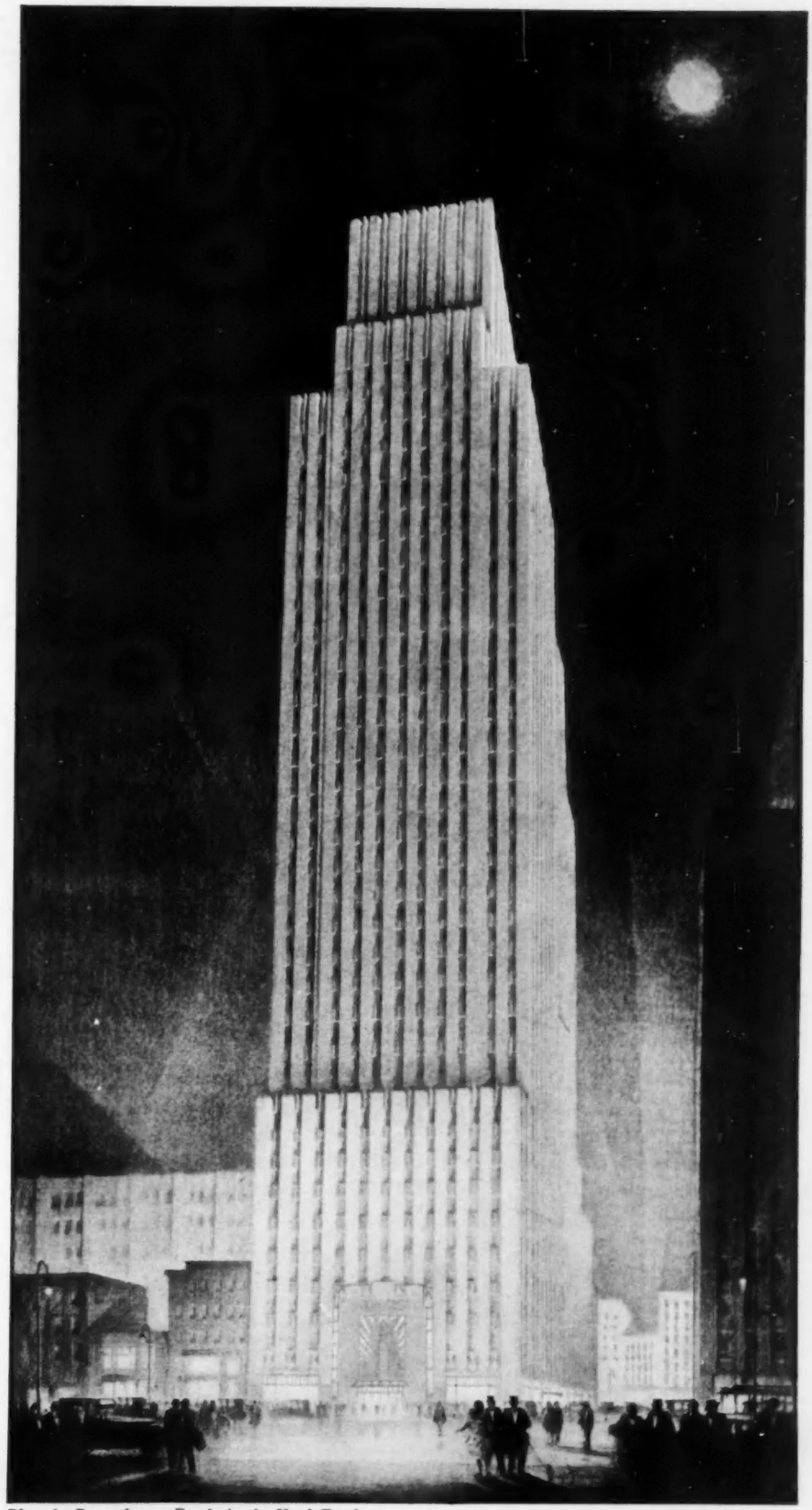


GROUND FLOOR PLAN

EMPIRE STATE BUILDING, NEW YORK
SHREVE, LAMB & HARMON, ARCHITECTS

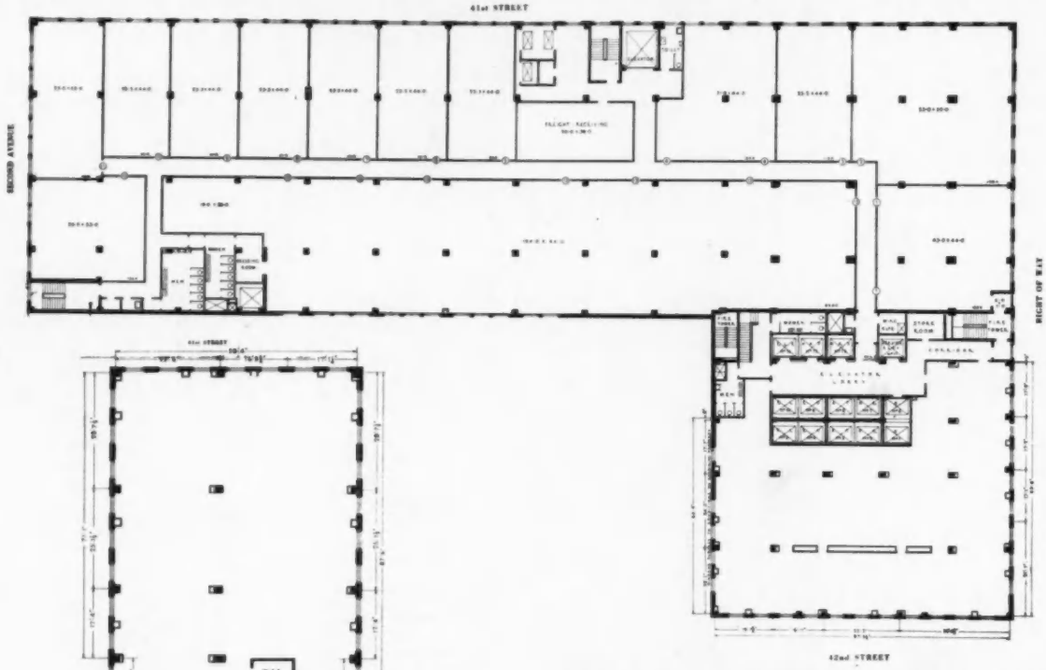
PRELIMINARY SKETCH OF PROPOSED BUILDING, NEW YORK. D. EVERETT WAID & HARVEY WILEY CORBETT, ARCHITECTS

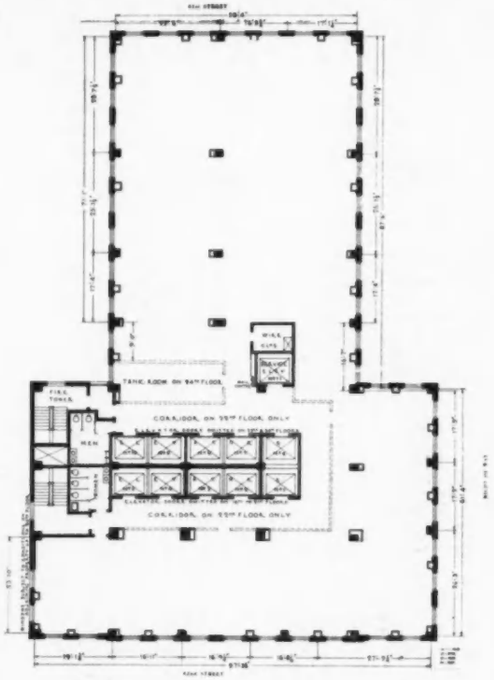
UNIV. OF MICH.

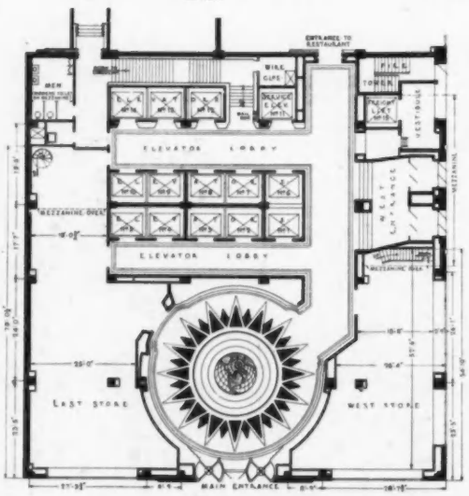


NEWS BUILDING, NEW YORK. JOHN M. HOWELLS, RAYMOND M. HOOD, ASSOCIATED, ARCHITECTS

Photo by Dryer from a Rendering by Hugh Ferriss

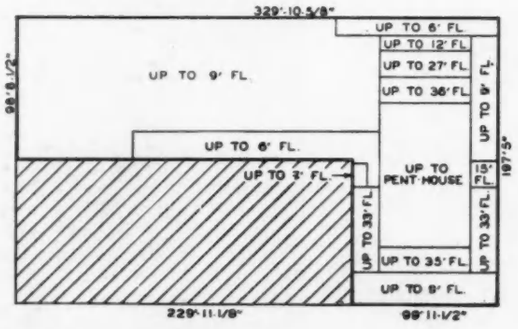






COST AND CONSTRUCTION DATA

Rentable Area: 602,192 sq. ft.
Total Cost of Building (exclusive of land): $6,500,000 (to date; approximate finished price).
Cubic Contents: 9,839,000.
Cubic Foot Cost: 66 cents.
Date of Completion: May, 1930.
Structural Frame: Steel.
Structural Floor System: Cinder arch.
Fireproofing: Concrete and brick.
Heating: Steam.
Plumbing: Water supply pipe, brass (up to 2½ in.); soil pipe, copper bearing steel.
Office Floors: Cement.
Office Walls: White coat plaster.
Office Partitions: Gypsum block and steel.
Corridor Floors: Terrazzo.
Trim: Hollow metal..

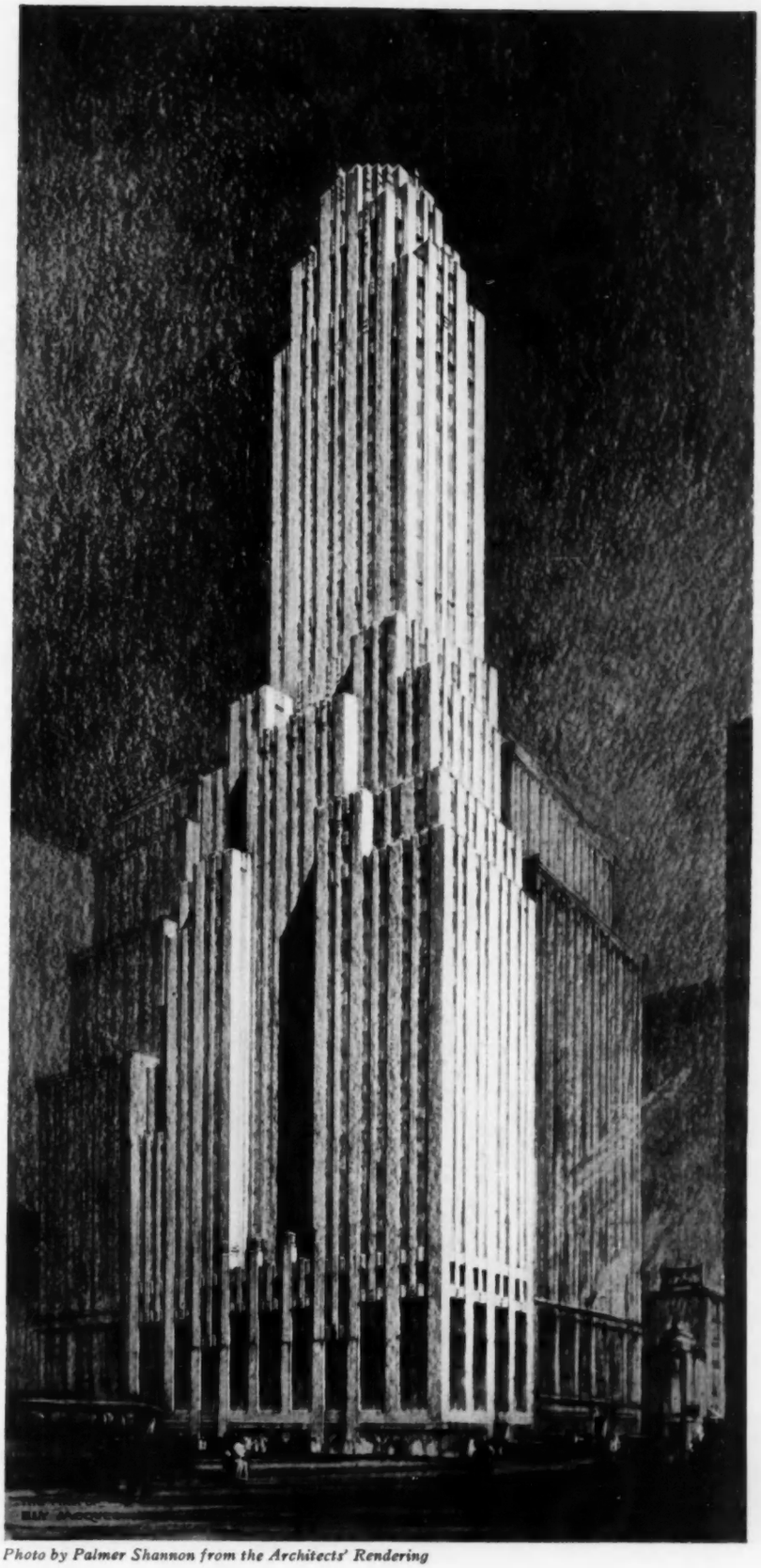


NEWS BUILDING, NEW YORK. JOHN M. HOWELLS-RAYMOND M. HOOD, ASSOCIATED, ARCHITECTS

BUILDING FOR IRVING TRUST CO., NEW YORK. VOORHEES, GMELIN & WALKER, ARCHITECTS.

Photo by Palmer Shannon from a Rendering by Chester B. Price

UNIV. OF MICH.



BUILDING AT SOUTH-EAST CORNER OF BROADWAY AND 41ST STREET. FIRM OF ELY JACQUES KAHN, ARCHS.

Photo by Palmer Shannon from the Architects' Rendering

UNIV OF MICH

CONSTRUCTION DATA

Rentable Area: 237,945 sq. ft.— { Office space, 229,865 sq. ft. / Store space, 8,080 sq. ft. }

Cubic Contents: 4,278,390 ft.

Date of Completion: May, 1931.

Structural Frame: Steel.

Structural Floor System: { 4 in. Cinder concrete arches / 3 in. Fill } —between beams.

Fireproofing: Cinder concrete, clay block, and brick.

Heating: Moderator.

Plumbing: Brass water supply pipe, galvanized wrought iron soil pipe.

Ventilation: Supply and exhaust.

Elevator Type: Signal control.

Lighting Type: Semi-indirect.

Radiator Type: Wall-hung.

Office Floors: Cement.

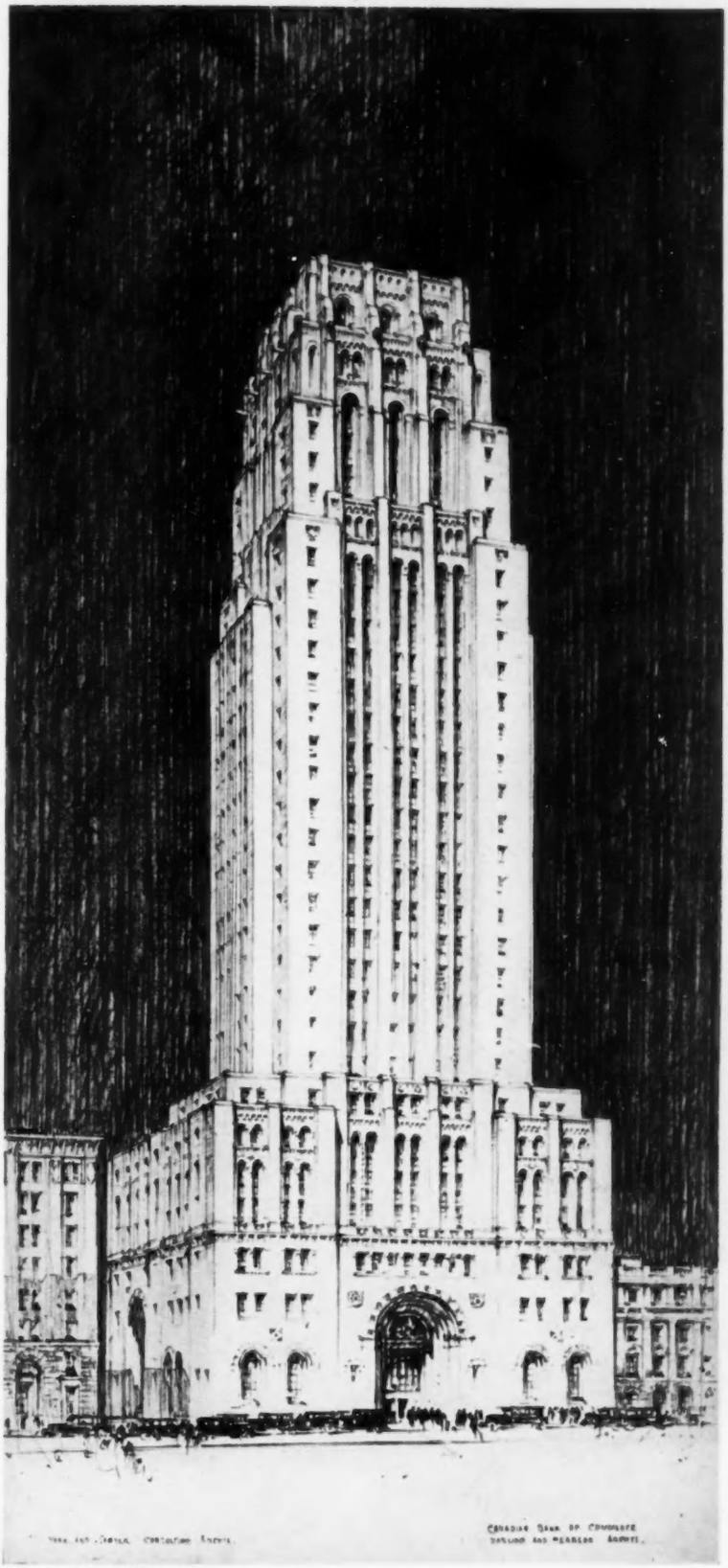
Office Walls: Gypsum and hard white plaster.

Corridor Floors: Terrazzo.

Windows: Stock steel.

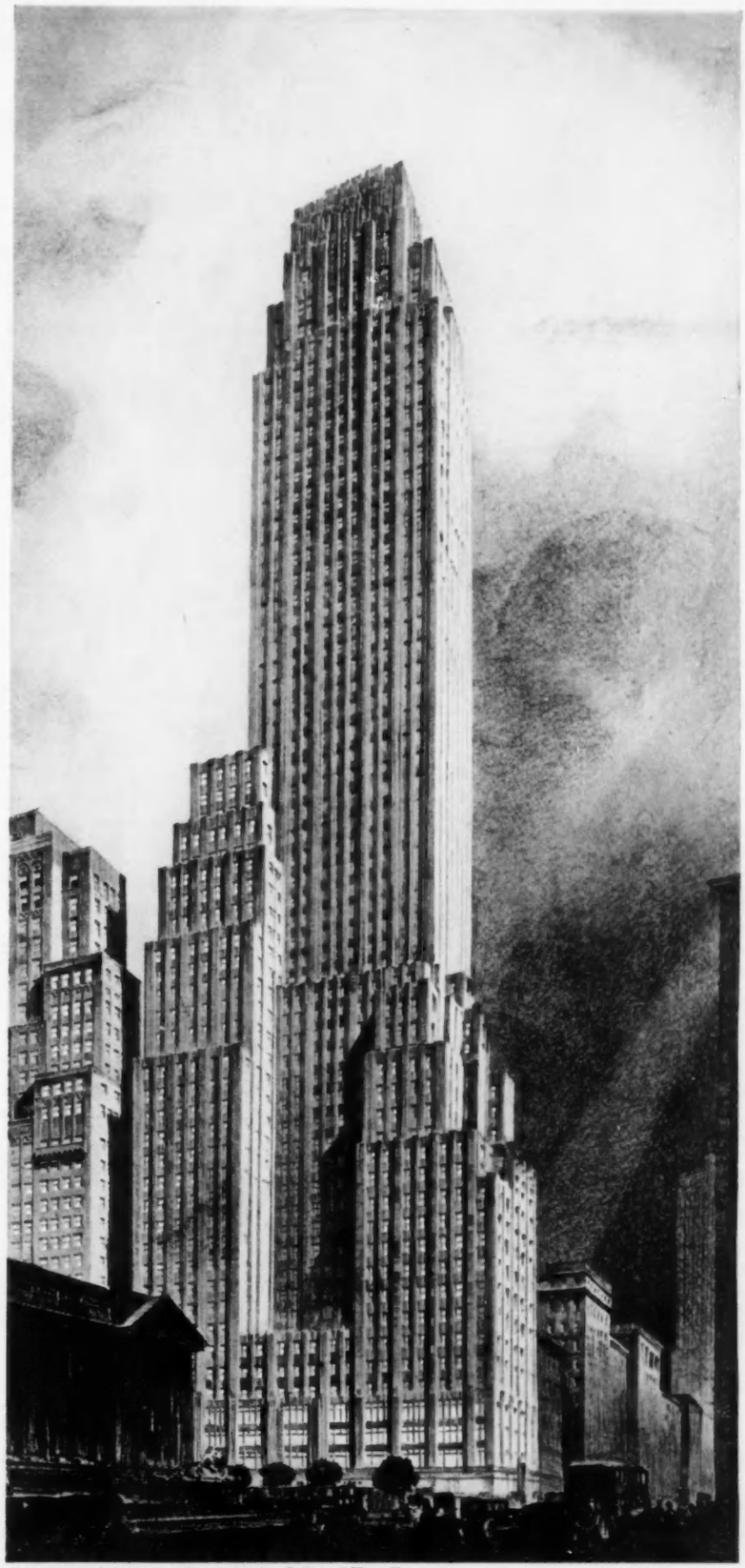
Trim: Steel.

BUILDING AT SOUTHEAST CORNER OF BROADWAY AND 41ST STREET. FIRM OF ELY JACQUES KAHN, ARCHITECT



CANADIAN BANK OF COMMERCE, TORONTO. DARLING & PEARSON, ARCHITECTS; YORK & SAWYER, CONSULTING ARCHITECTS

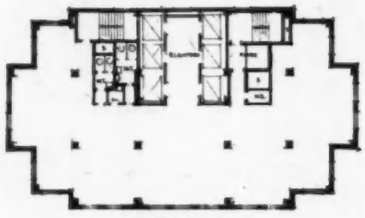
Photo by Palmer Shannon



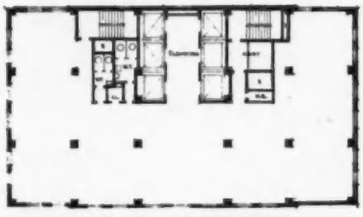
BUILDING AT 500 FIFTH AVENUE, NEW YORK. SHREVE, LAMB & HARMON, ARCHITECTS. H. R. ALLEN, ASSOCIATED

Photo by Juley from a Rendering by J. Floyd Yewell

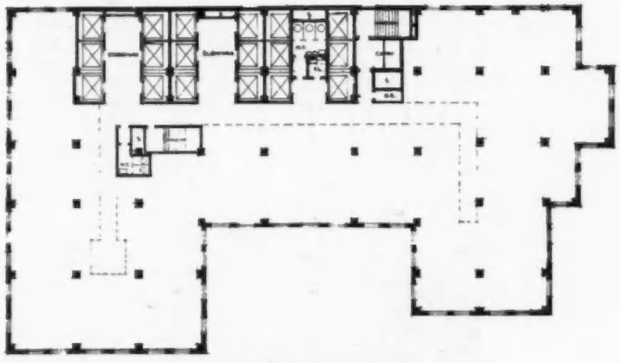
UNIV. OF MICH.



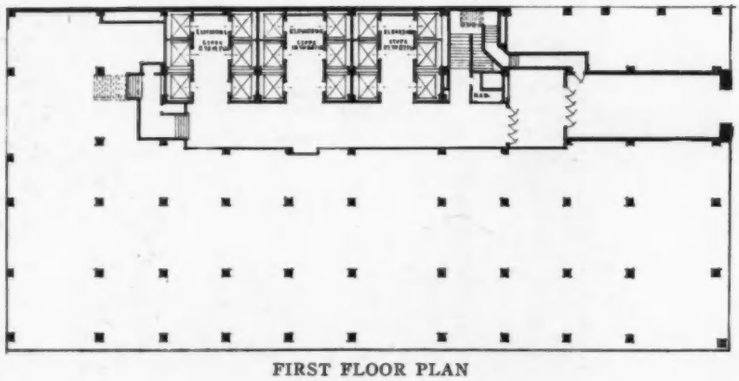
55TH FLOOR



43RD TO 54TH FLOORS

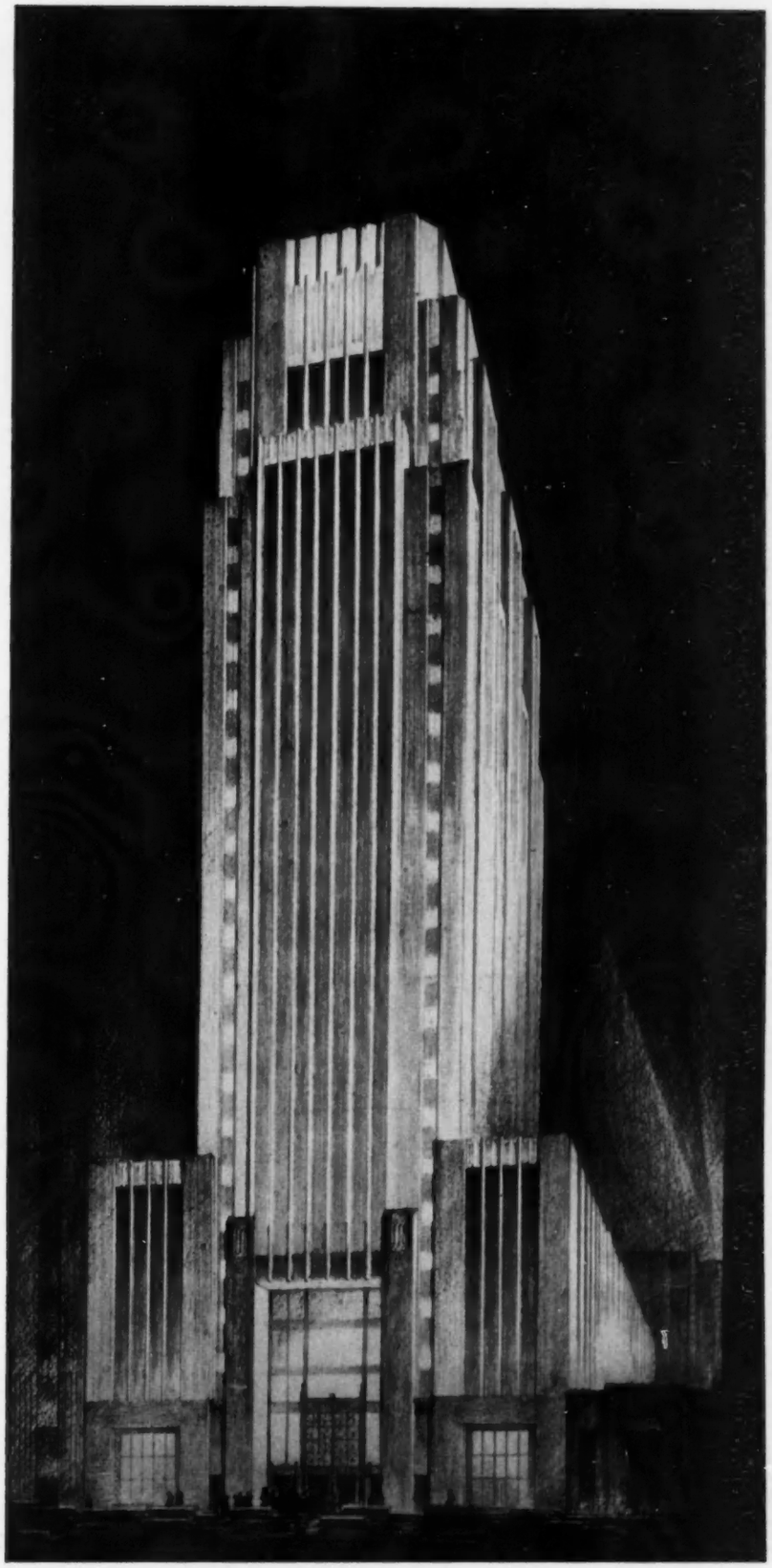


18TH AND 19TH FLOORS



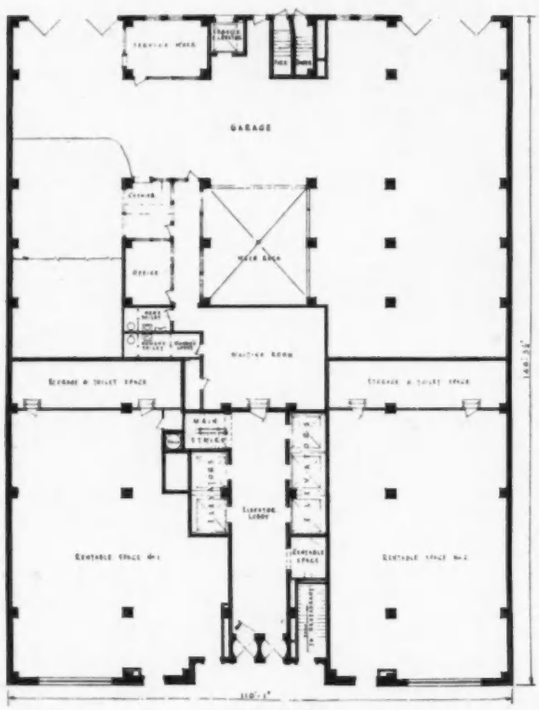
FIRST FLOOR PLAN

BUILDING AT 500 FIFTH AVENUE, NEW YORK.
SHREVE, LAMB & HARMON, ARCHITECTS.
H. R. ALLEN, ASSOCIATED

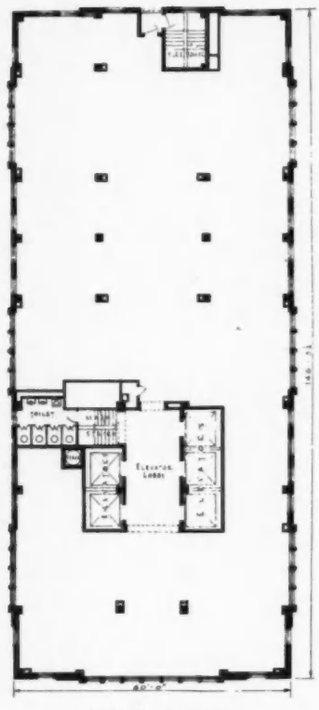


1616 WALNUT STREET BUILDING, PHILADELPHIA. TILDEN, REGISTER & PEPPER, ARCHS.

UNIV. OF MICH.



FIRST FLOOR



A TYPICAL FLOOR

CONSTRUCTION DATA

Rentable Area: Offices, 199,857 sq. ft.; bank, 7,000 sq. ft.; garage, 49,655 sq. ft.

Cubic Contents: 3,140,000 ft.

Date of Completion: August 1, 1930.

Structural Frame: Steel.

Structural Floor System: Cinder concrete.

Fireproofing: Brick, cinder block, and concrete.

Heating: Temperature control, steam system.

Ventilation: For toilets, garage, bank and basement.

Elevators: Push button, full automatic, high speed.

Lighting: Semi-indirect and indirect.

Radiators: Enclosed.

Plumbing: Water supply pipe, brass; soil pipe, galvanized steel.

Office Floors: Cement.

Office Walls: Plaster.

Office Partitions: Gypsum block.

Corridor Floors: Terrazzo and marble.

Windows: Steel.

Trim: Metal.

1616 WALNUT STREET BUILDING, PHILADELPHIA.
TILDEN, REGISTER & PEPPER, ARCHITECTS

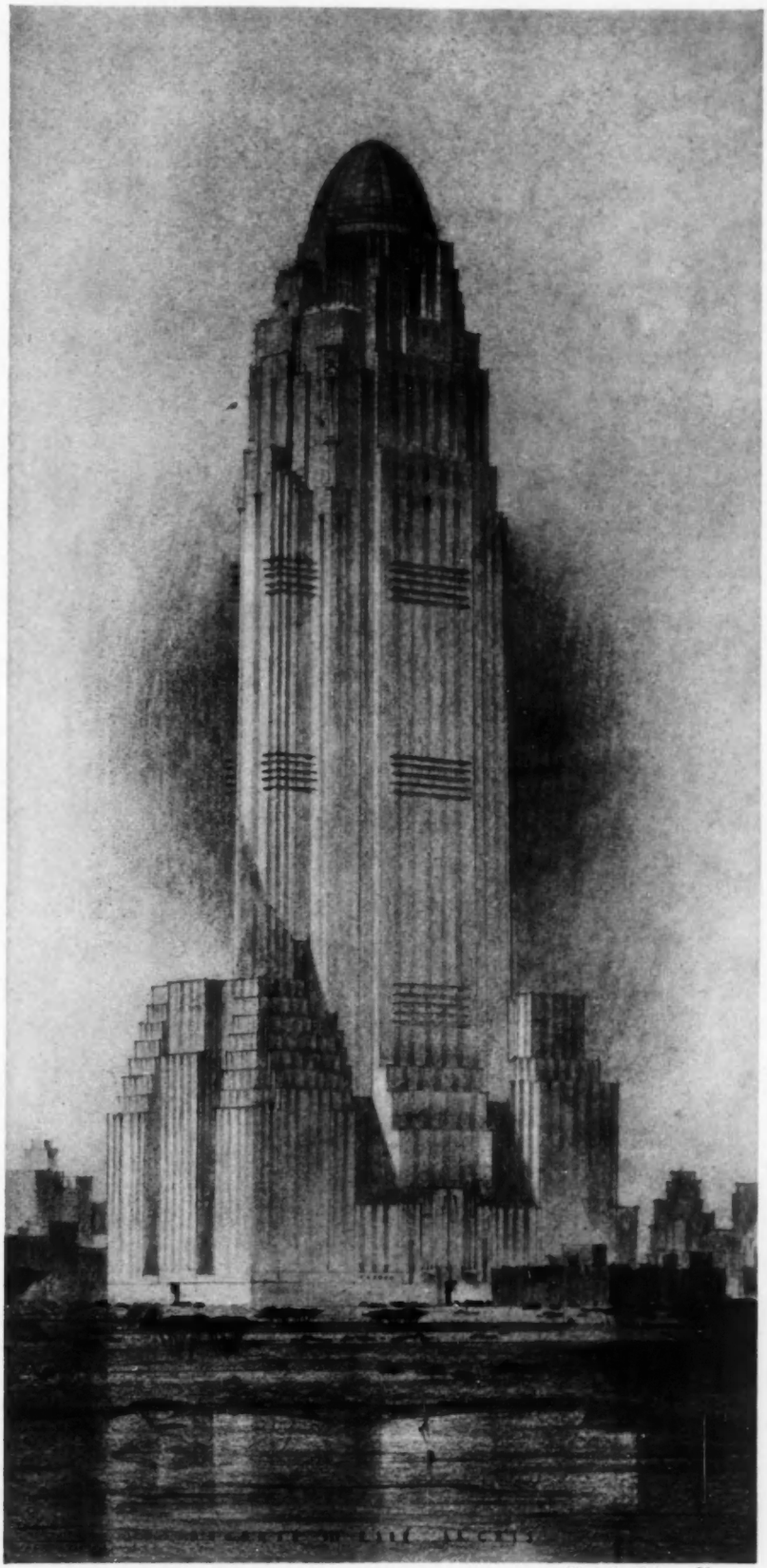
SHELL BUILDING, SAN FRANCISCO. GEORGE W. KELHAM, ARCHITECT

Photo Gabriel Moulin

COST AND CONSTRUCTION DATA

Rentable Area: 162,000 sq. ft.; Stores, 5,500 sq. ft.
Cubic Contents: 4,085,000 ft.
Cubic Foot Cost: 78 cents.
Date of Completion: April 20, 1930.
Structural Floor System: Steel beams, concrete slabs.
Fireproofing: Concrete and brick.
Heating: High-pressure boilers.
Ventilation: Toilet rooms only.
Elevators: Signal control.
Lighting: Indirect.
Radiator: Wall type.
Plumbing: Brass pipe; water supply pipe, brass; soil pipe, cast iron.
Office Floors: Linoleum.
Office Walls: Plaster, painted.
Office Partitions: Portable wood; also terra cotta tile.
Corridor Floors: Rubber tile.
Windows: Double-hung steel.
Trim: Wood (mahogany).

SHELL BUILDING, SAN FRANCISCO.
GEORGE W. KELHAM, ARCHITECT



SKETCH FOR PROPOSED BUILDING, NEW YORK. FIRM OF ELY JACQUES KAHN, ARCHITECTS

Photo by Palmer Shannon

Photo by Palmer Shannon from a Rendering by Chester B. Price

WESTERN UNION BUILDING, NEW YORK.
VOORHEES, GMELIN & WALKER, ARCHITECTS

UNIV. OF MICH.

Photo by Palmer Shannon from a Rendering by Schell Lewis

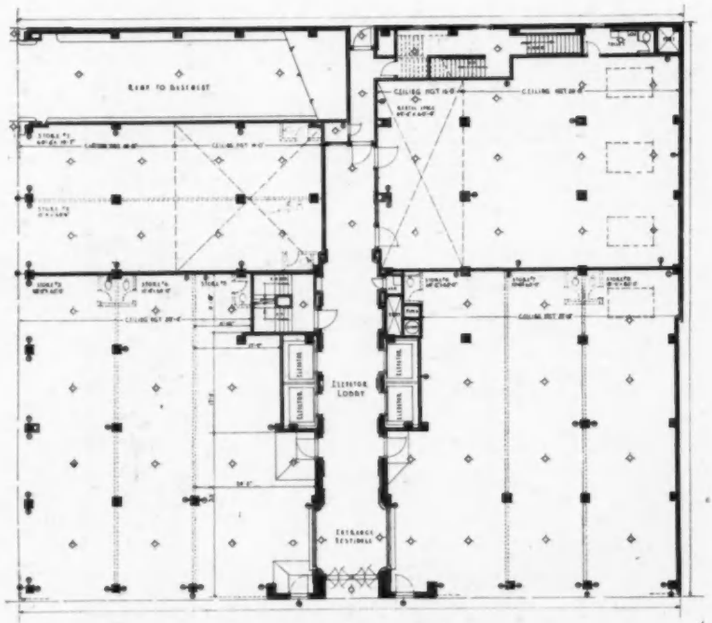
INDEMNITY BUILDING, NEW YORK.
FIRM OF ELY JACQUES KAHN, ARCHITECTS

UNIV. OF MICH.

HAROLD G. FERGUSON BUILDING, LOS ANGELES.
WALKER & EISEN, ARCHITECTS

UNIV OF MICH

A TYPICAL FLOOR



GROUND FLOOR

COST AND CONSTRUCTION DATA

Rentable Area: 109,667 sq. ft.

Total Cost of Building (exclusive of land): $1,286,000.

Cubic Contents: 2,268,000 cu. ft.

Cubic Foot Cost: $.57.

Structural Frame: Structural steel.

Fireproofing (material): Concrete.

Structural Floor System: Concrete (steel joists).

Heating: Low pressure steam.

Ventilation Equipment: None.

Elevator Type: Variable voltage, 600 ft. per second speed.

Lighting Type: Semi-indirect.

Radiator Type: Wall hung.

Plumbing: Wrought iron water supply pipe, cast iron soil pipe.

Office Floors: Concrete.

Corridor Floors: Rubber marble.

Office Walls: Plaster.

Office Partitions: Clay tile.

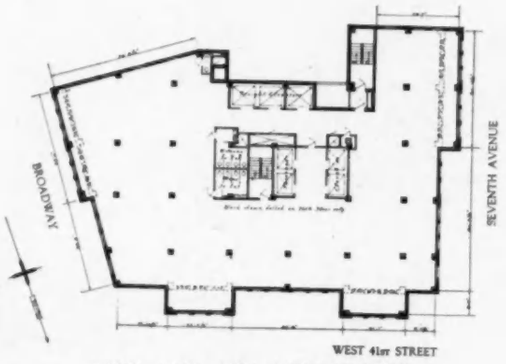
Windows: Steel double-hung.

Trim: Philippine mahogany.

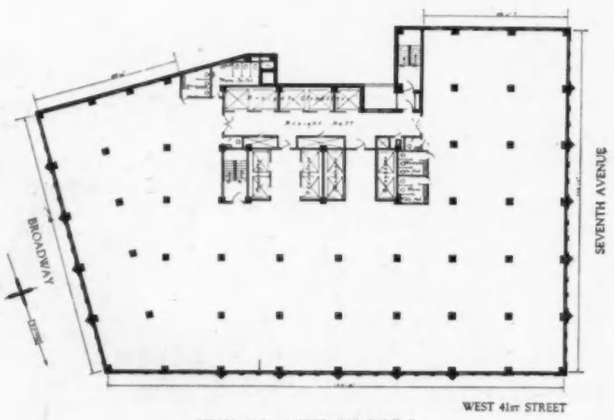
HAROLD G. FERGUSON BUILDING, LOS ANGELES.
WALKER & EISEN, ARCHITECTS

Photo by Palmer Shannon from a Rendering by Schell Lewis

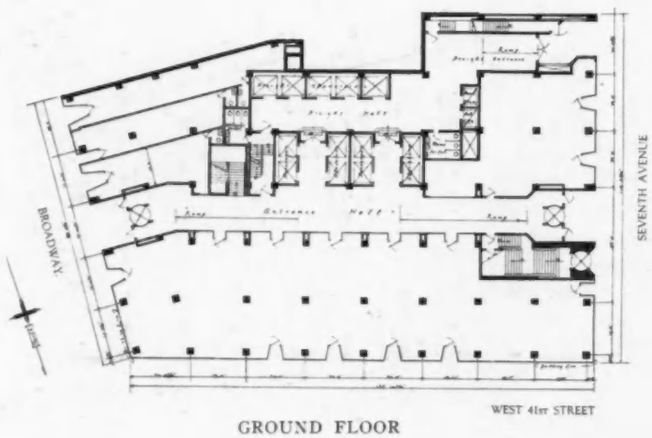
BRICKEN BUILDING, NEW YORK.
FIRM OF ELY JACQUES KAHN, ARCHITECTS



24TH, 25TH AND 26TH FLOORS



5TH TO 16TH FLOORS



GROUND FLOOR

COST AND CONSTRUCTION DATA

Rentable Area: 364,995 sq. ft.

Office space, 354,095 sq. ft.

Store space, 10,900 sq. ft.

Cubic Contents: 5,906,305 ft.

Date of Completion: January, 1930.

Structural Frame: Steel.

Structural Floor System:
4 in. cinder concrete arches
3 in. fill
between beams.

Fireproofing: Cinder concrete, brick and clay blocks.

Heating: Vacuum.

Plumbing: Brass water supply pipe, galvanized wrought iron soil pipe.

Ventilation: Supply and exhaust.

Elevator Type: Car switch, hand-operated gates and doors.

Lighting Type: Semi-indirect.

Radiator Type: Cast iron, leg type.

Office Floors: Cement.

Office Walls: Hard white plaster and gypsum.

Corridor Floors: Terrazzo.

Windows: Steel casement and sash.

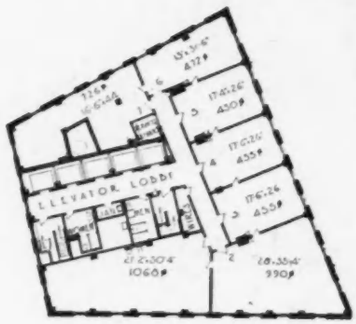
Trim: Steel.

BRICKEN BUILDING, NEW YORK.
FIRM OF ELY JACQUES KAHN, ARCHITECTS

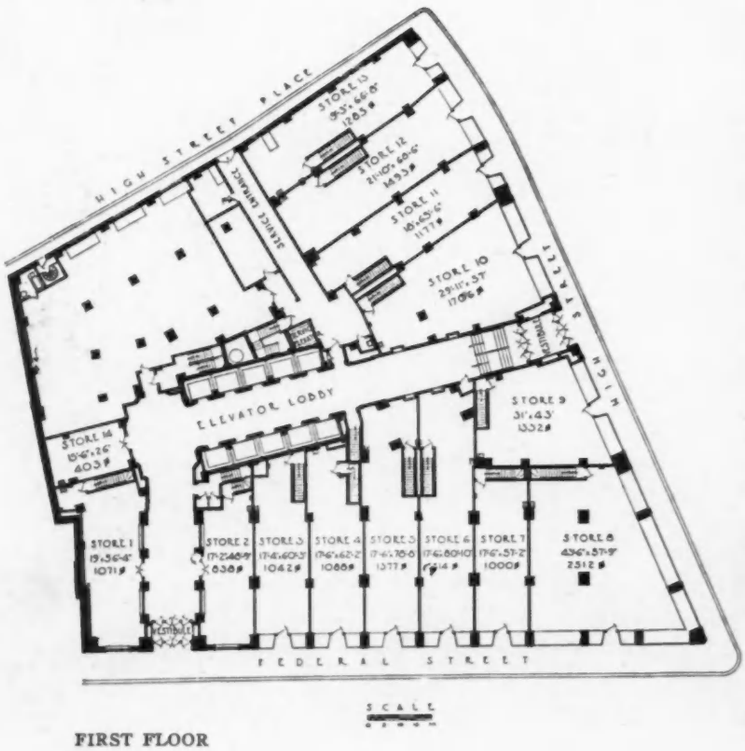
140 FEDERAL ST. BUILDING, BOSTON.
PARKER, THOMAS & RICE, ARCHITECTS.
HENRY BAILEY ALDEN, ASSOCIATED

UNIV. OF MICH.

13TH FLOOR



16TH FLOOR



FIRST FLOOR

CONSTRUCTION DATA

Rentable Area: Lofts, 285,170 sq. ft.; Stores, 34,210 sq. ft.

Cubic Contents: 5,380,000 ft.

Date of Completion: February 1, 1930.

Structural Frame: Steel.

Structural Floor System: Concrete joist, tile fill.

Fireproofing: Terra cotta.

Heating: Steam, zoned system, coal fuel.

Ventilation: Partly mechanical.

Elevators: Signal control.

Lighting: Direct.

Radiators: Cast iron exposed; copper concealed.

Plumbing: Water supply pipe, brass; soil pipe, cast iron.

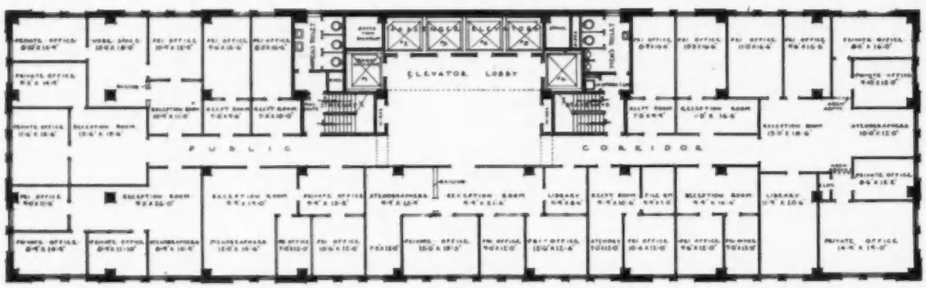
Corridor Floors: First floor, marble; upper floors, terrazzo and rubber tile.

Trim: Wood for doors; plaster reveals in windows.

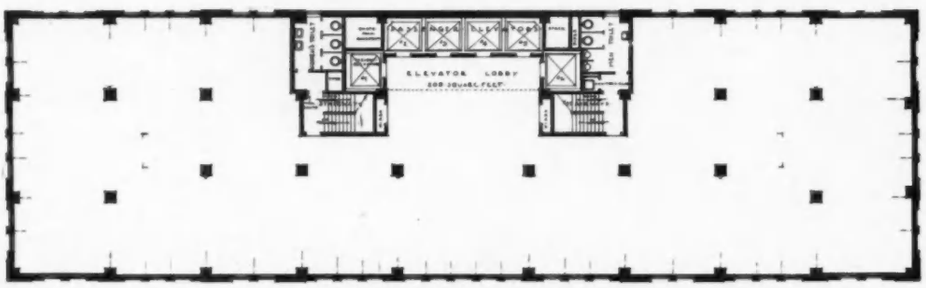
140 FEDERAL ST. BUILDING, BOSTON.
PARKER, THOMAS & RICE, ARCHITECTS.
HENRY BAILEY ALDEN, ASSOCIATED

MARKET STREET NATIONAL BANK BUILDING,
PHILADELPHIA. RITTER & SHAY, ARCHITECTS

UNIV. OF MICH.



TYPICAL FLOOR SUBDIVIDED



TYPICAL FLOOR WITHOUT PARTITIONS

MARKET STREET NATIONAL BANK BUILDING,
PHILADELPHIA. RITTER & SHAY, ARCHITECTS

THE DESIGN OF OFFICE BUILDINGS

BY

ARTHUR LOOMIS HARMON

LET us understand each other. Mr. Harmon is writing this article in Mr. Lamb's absence from his office. He is out in the drafting room, designing office buildings.

When the "design" of a modern office building is mentioned, the lay mind thinks of the exterior, and so does the architect as a rule. That is natural. The interior is a honeycomb, the plan is not apparent; the use is obvious and not appealing. The exterior can be seen as a whole,—often the scale is tremendous and the height romantic. The reaction in the mind is direct and appreciable. The reasons for this exterior, however, are many and conflicting. They are not only confusing to the man on the street but are apart from his reaction. To the designer they are at once the causes of his opportunity and the limitations imposed upon his realization of it.

Conscience, self respect and self preservation demand that we meet the useful, economic and structural requirements. Unless these are met squarely, æsthetic values may be false. When these are met the building may be said to be organic or to be described in words to that effect, —several words probably. At any rate, æsthetic values may predominate. The next problem is to satisfy the eye without offending the intelligence. Interest lies largely in buildings' height.

We must mention briefly the forces producing an office building and the limitations imposed by them and the structure. They are all a part of the design. There is probably no building in which the organism, if adhered to, is so inherent a part of the æsthetic possibilities,—that should simplify everything. All you have to do in theory is to be truthful, and beauty is achieved. But will the eye of sinful man be pleased with the result? When pretty girls have a hard time to find husbands, I am sure it will.

The development of steel construction in conjunction with the modern elevator; the modern city and its demand for spaces to transact business in congested areas; the need for light and air; these are the chief forces. What are the limitations which mould the form? In bulk they are the shape of the property, the lighting of internal areas, the zoning regulations of various cities, and the demand that the rentable area bear a proper relation to the total cubage to produce a paying investment. In height buildings are limited by the area of the property; the economic consideration involved in the cost of steel; particularly the relation of height to base governing the wind bracing; and the economic and physical limitations in height for elevators. Until more than one elevator travels successfully in one shaft, there is in a large building with central elevators, a cone of elevators and utilities crowding the office spaces at the base of the tower and leaving dark spaces at the top in the point of the cone.

In New York particularly the zoning regulations which allow an area for the tower of 25 per cent of the total plot area, with the setback limitations, fix a maximum tower area at the base of the tower at about the 30th floor for large buildings. Depth of office spaces is another consideration. Certain types of buildings may permit interior spaces for loft use at great distance from the light, but for strictly office use a depth of from 25 to 30 feet is more or less a standard.

One of the most difficult masses is that in which every possible foot is demanded within the zoning envelope up to the point at which the tower commences,—say 30 floors,—and then 20 or 30 floors of straight shaft of tower are superimposed. This is one of the characteristic forms of the New York group. An interesting contrast in this respect is that made by comparing the first plans made for the old Waldorf-Astoria site for an earlier group of owners, who believed great loft spaces to be the economic demand, with the plans for the present Empire State Building. The first is a series of courts, pavilions and setbacks. In the second the mass is cut down at the base and appears on the higher floors. Five floors cover the entire property, forming a platform below 75 floors of the shaft (with some increase at the base to get outside the cone of elevators and utilities) of well lighted office space. It is an indication of what may be looked for in the acquisition of large areas permitting large tower areas and great heights.

Having gotten by these troubles, it would seem as though the designer might begin to have some latitude. Not yet, however. Office spaces must be laid out so as to permit of the greatest latitude to future tenants in locating offices. A 9-foot wide office is considered most desirable by the greatest number of tenants, so that the column spacing is determined at around 18 feet, and the fenestration becomes a series of windows, each from 4 feet to 5 feet wide and from 6 feet to 7 feet high,

about 9 feet on centers. Breaks in the wall face interfere with renting. Deep reveals are not advisable for the same reason. At intermediate setbacks window lintels must still be kept high and parapets low.

Too much cannot be piled on the top as, economically, it may become a drag on the rest of the building unless charged off to advertising. All of the conditions mentioned are elements in the design and, insofar as they have been neglected, the designer is ignorant or unfaithful, not only to his client but "to his Art." So far the designer has had to "woo his Art," not only in the presence of a committee but, worse, as one of them, and not the most important member. The owner, the real estate man, the structural engineer, and the elevator expert all are important, and it is obvious that the jade has flirted abominably, not only with the rich owner and the fascinating real estate man, but even with the elevator boy. You might think that he could now expect a long, cozy tete-a-tete over the drafting board, but not at all. When he gets there he finds the mechanical engineers waiting to talk to her about the plans. So that the ardent wooer may expect to see his mistress receiving presents from the plumber and holding hands with the contractor in some part of the building where he least expects it. The contractor talks about money, not only in materials and construction, but about that form most aggravating to a designer,—Time! In a large operation the carrying charges run into thousands of dollars a day, and from this stage, if not before, the Time motif runs through everything.

Time in choice of materials, time in types of construction, time in the "wooing of his Art," but none whatever in which to go back and change. "The moving finger writes and, having writ, moves on." The designer has not much more time to consider the exterior trappings of the form than we have to mention them briefly.

One of the first ideas to bother him is the impossibility (at present at least) of expressing in the exterior the steel construction of the building. If he did, it would not now, at least, please the eye nor satisfy the mind; later perhaps it will. Still there is the urge to be consistent. Another modern condition in shopping districts is the fact that on the ground floor a maximum of show window width is required. A massive wall must be carried on a sheet of glass, and the mind accustomed to think of walls resting on the ground demands the illusion of support. Where the wall above is set back of the street line, this sheet may be in advance, permitting the wall to appear to descend behind it. It may be only an illusion, but who lives happily without them?

In considering the exterior materials, the steel skeleton must first be covered, wall panels must be filled with some material,—watertight and insulating against heat and cold. Requirements of the building bureau must be met. Masonry to date best fulfills all requirements, but the eye must cease to regard it as an expression of a solid bearing wall and rather as a covering only. Metal and glass are being considered but have not yet been tried and much less tested by time. Development of new rustless materials, aluminum and chrome steel offer new opportunities. In the Empire State Building not only are the spandrels to be of gray aluminum but the glass is to be set out beyond the wall face between projecting polished chrome steel mullions on the theory that a reveal of convincing depth back from the wall face is impossible. The effect will be that of a continuous wall face with applied mullions. Structurally it is honest. This system of construction will be discussed fully in THE ARCHITECTURAL FORUM in the near future. The wall as a series of vertical piers seems the most satisfactory solution to date,—not because that necessarily expresses the structure more accurately but because in its simplicity and accent of height where height predominates, it comes nearer to satisfying the eye. The *Daily News* Building on 42nd Street by Howells and Hood is an excellent illustration.

Wherever an architecture has been evolved, it has gradually clothed itself in certain conventions of construction and form and mannerisms of ornamentation which, when fully developed, constitute a style. It is an organism and can no more be invented than can a language. It is, of course, possible to imagine a style in which use is the sole criterion,—but only if all effort to temper usage to a certain gratification of the senses through the eye is abandoned,—a style with no illusions whatever,—which God forbid! The modern office building requires a new vocabulary and, given sufficient time, will have its style. In the meantime old words lose their magic, and words no gentleman architect would have thought of using 20 years ago are being bandied about with cheerful nonchalance.

We are now in the midst of the great experiment. It may be admitted that the experimenter who essays something new and untried, though it be "wild," is contributing to the final result,—that is if one is an optimist on the survival of the fittest theory. The pioneer must have the courage of his convictions. If he is right, he is forgotten in the mass of similar work which follows; but if wrong, he is likely to be remembered.

At any rate we, the heirs of all the ages, are now busy trying to determine which of the stocks of our inheritance have today a marketable value. It is painfully evident that we cannot subsist solely on this inheritance, and that we will have to produce something for ourselves.

OFFICE BUILDINGS NOW AND THEN

BY

CHARLES G. LORING

THE small office building is usually the step-child of the family, but on occasions it is the Cinderella.

Just below that technical classification is the village block, named after the local magnate, and built without an elevator to save those golden twins,—first cost and running expenses. The height is limited to the power of personal uplift,—say three flights of stairs. At the other extreme tower the giants of the metropolis, supreme embodiment of mechanistic America. The very lowliness of the village block allows a nice adaptation of native historical styles, the Atlantic and Pacific Colonial, Georgian and Mission; the very loftiness of the skyscraper stimulates untrammeled aspiration, but with the medium-sized office building the architect is challenged to recast the obvious and refine the hackneyed to revive public interest.

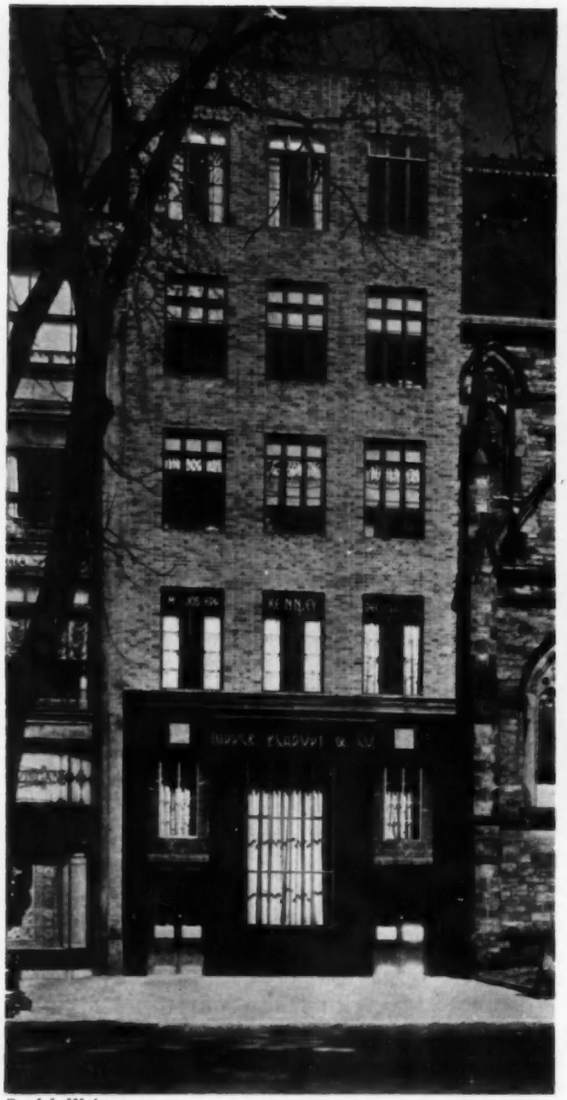
The offices of our grandfathers were without steel frames and files, without elevators and radiators, without telephones,—and without skirts. In those days gentlemen of the old school still wore shawls in cold weather and went home to dinner at three o'clock, while the clerks in the counting rooms stood at high desks with sloping tops and tied up the correspondence in red tape. The evolution of the office building has been almost as abrupt as that of the automobile, and the transmutations of its facade as fantastic as those in women's dresses.

The Chicago Chapter of the Institute of Architects reports that in the 13-story Tacoma Building, torn down at 40 years of age, the structural steel and floor construction were found to be still sound. The accelerated evolution is not from inherent weakness; it is the migrating zone and shifting land value which condemn to demolition the office building which was once a residence and also the offices built up to the limit of a restriction ordinance which has since been relaxed.

The number of office buildings is organized for such a disciplined and standardized objective all across the continent that the typical external expresses the hive of identical cells based on the geometry of the steel and has little relation to local materials, local traditions, or local climates. With minor office plants, economical planning is not an abstract general principle, as it is where the lot has light on three or more sides. It requires the ingenious exploitation of a constricted site. Narrow fronts, dead party walls and restrictive ordinances mean that the little fellow must be satisfied with the best under the circumstances, not necessarily with the ideal. In the large building where there are many units on a front the most efficient,—say 10 feet for the single desk and double that for the executive, may be easily approximated, but when the frontage is narrow the unit may have to be cut to 8 or expanded to 12 feet in width.

Sometimes the keynote of the facade is set by a banking house or by a restaurant or by a swagger salesroom on the street floor, but the salient features are national and not the prerogative of any one state. Despite the revivals, like the quaint design by Little & Russell for the Lopez Building, where shops dominate the offices above, the most potent preoccupation today is to be modernish. Public buildings, which represent the welding of tradition and custom in our political and social forms of civilization, may well be conservative in design; our laws and our systems of education have not been created like those of the Soviet Republic since the World War. In the spending of public moneys the designer must sink his individuality in that of the community,—the community which even in the new lands has brought its past with it. In commercial structures, on the contrary, brilliant eccentricity often is the hall mark of success as in the American Radiator Building in New York, by Raymond M. Hood, where both the black shafts, tipped with gold, of the exterior and the unique basement showroom frescoed with American fire myths proclaim what are the company's wares.

Quite naturally this new development, which is to coalesce into a national architecture and which comes from Yucatan, Scandinavia, Epstein and Le Corbusier, has reached its first objective in commercial buildings. Offices and salesrooms and banks desire publicity; the owners are spending their own money, and the project is not often intended for posterity. The conspicuous contemporary style is architecture with a difference,—almost with a vengeance. The dogma is still heterodox and although the varied elements cannot yet be synthesized in one definition, the characteristics are emerging clearly. There are enough typical forms of mass and silhouette, of incorporated and applied ornament for the bystander



Paul J. Weber

(Above) State Street Trust Building, Boston,
Parker, Thomas & Rice, Architects

(Left) Kidder Peabody Building, Boston,
Strickland, Blodget & Law, Architects

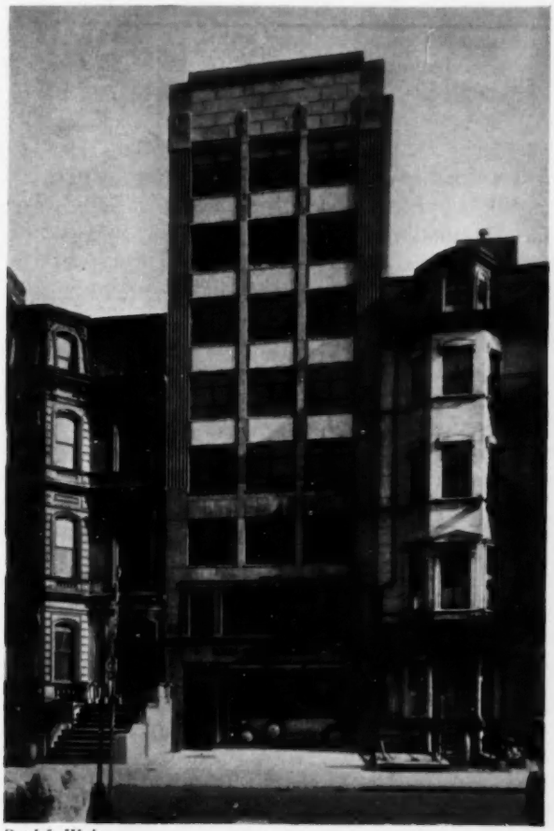
to be able to say of a new structure that it is or is not "Modern."

There is the *architectural* Modernist style which has come to us when we were in a receptive frame of mind, from Denmark and Finland, countries far removed from Greece and Italy; a principle of masses rather than of style or ornament. The vision has crystallized into basaltic crags, and the perspectives of it are rendered in northern murk. But it is organic; the masonry shell adheres to the steel skeleton; it is vibrant with the thrust of the dynamo, it welcomes mass production and over-tops the craftsman.

Then there is the *decorative* Modernist style of thin planes and surfaces; lighting fixtures in fragile spirals of glass, blended with tinkley joss house details; furniture in triangles, suggesting those structurally significant intersecting lines of the folded paper cockhat.

In the syndicated journal of a chain of department stores, entitled "Modes and Manners," appears this critique: "Of course nobody thinks of disputing any more the established facts of the twentieth century period. But, in the general enthusiasm, the adjective 'modern' is being quite seriously overworked. It is being used in connection with everything that breaks with tradition, whether in the way that is significant or in the way that is quite meaningless. And the result is that we bewildered moderns, looking this way and that, are more than a little uncertain as to what is authentic and what is negligible in this exciting present-day scheme. The new period that has evolved out of these brave confusions is inspired by originality and freedom from tradition."

The illustration, entitled the "Dawn of the 20th Century," shows on the left one of the early endeavors to represent steel construction



Paul J. Weber

(Above) Rolls-Royce Building, Boston,
S. Bruce Elwell, Robert M. Blackall, Architects

(Right) Building for A. F. Goodwin, Boston,
Little & Russell, Architects

encased in fireproof material with the maximum glass surface for the occupants. So far the logic of the Beaux Arts was admirable, but the decorative crescendo swept the architect into artistic and financial extravagance and a literal and metaphorical false front. The building to the right, which shouts aloud the renting agent's demand for bay windows, has anticipated by 25 years the crystal corners and glazed bands and overhangs which are absolutely what the smart young buildings are wearing this spring.

Two designs which are dated but not addressed, which will be known as belonging to the Hoover period rather than to the Boston School and which face each other across Newbury Street, Boston, now in the throes of transformation from domesticity to commercialism, are the Kidder-Peabody and the Rolls-Royce buildings. The first, designed by Strickland, Blodgett & Law, has two stories of black Wisconsin granite with red French griotte marble over the doors of polished steel. The raised letters are of chromium. The sash is red to match the marble, and over both the name and the doors there are floodlights. The upper four stories are of old Virginia red brick, soft and pleasing in color and texture. The design is certainly contemporary, almost Modernistic,—with a big capital M,—but it is founded on the accepted Georgian proportions.

The Rolls-Royce building, by S. Bruce Elwell and Robert M. Blackall, is a solution of the demand for maximum of rental space and maximum of light on an inside lot. Here again, the tempo of the composition is set to harmonize with the two-story salesroom below. To allow the entrance of large cars, the show window has one movable sheet of plate glass, the mechanism allowing it to be lowered into the basement. The

Paul J. Weber

"Dawn of the 20th Century"
Boylston and Berkeley Streets, Boston

enframement is of dark marble and, above, the six stories of offices are enclosed in light yellow artificial stone with golden tile panels between the windows. The conventionalized leaf ornament of the nineteen-twenties is subordinated to the warmth and richness of the color patina so symbolic of the principal tenant.

Size, shape or shade may further the client's quest of publicity. Of the dynasty of the all-highest, the Singer, Metropolitan, Woolworth and the Chrysler tower has, each in turn, won the golden fleece. The Chicago *Tribune* gained world-wide celebrity through the competition for its home offices and,—incidentally,—the design placed second in the competition inaugurated an office building cult from the Great Lakes to the Rio Grande. The American Radiator Building in New York carries the logic of its wares into the realms of fantasy, and stands a monument of propaganda. Sometimes the ultra-conservative is as effective publicity as startling novelty. The office building by Parker, Thomas & Rice above the State Street Trust is Boston pure and simple; it personifies "the old reliable."

But the pedant has no truly classic precedents for his task, and Raymond M. Hood wrote some years ago in THE ARCHITECTURAL FORUM: "An office building is no more a slavish copy of the Chateau of Blois merely because a little Francis I ornament is applied to it than an elephant with a yard of lace thrown over his back is a copy of a French manikin in a Paquin dress. Style and surface ornament are only the hooks on which critics hang their wares, and in reality, are they not a very minor and unessential part of the problem?"

To Ruskin's seven lamps of architecture an eighth should be added for the big or little office building and the floodlight. The dim and flaring torches of the middle ages had their superb wrought iron sconces on the exteriors of Renaissance palaces. A multitude of glass cups with floating wicks were used like captive glow worms on the Italian piazzas and in the gardens of Vauxhall. Rows of flickering open gas burners were used on theaters a hundred years ago. At the Chicago World's Fair, the proletariat thrilled when electricity extended the possibilities and buildings were outlined with brilliant unshaded bulbs which followed the architectural lines but which did not reveal the surfaces,—or else a single distant searchlight blinded one facade. The next step was the use of hidden projectors set close to the object. The entire structure is transfigured; the visible walls which rise above the black gulf seem translucent; brilliant new high lights are silhouetted against fathomless black; and the daylight colors are intensified by contrast with the outer darkness. Street fronts become iridescent cloth of gold or snowy crags beneath wheeling northern lights; tower tops become jewel caskets of incandescent tracery or crystallized beacon fires, all as mirage-like as the "stately pleasure dome" of Kubla Khan. And on misty nights or snowy, the shaft of welded beams from the floodlights carries the architecture up and into the aurora borealis.

In appraising office design, where whole new buildings and new facades and new fragments are crystallizing morning by morning, each expressing the impact of new forces, some criterion must be established, some gauge of worth. Shall it be beauty? No, for with contemporary creations the observer's habit of mind has too many preconceptions, and after all, "What is Art?" Novelty? No, for in the very nature of things a masonry structure cannot remain a novelty. Sincerity? Why not?

What was the architect's objective when he made the design? Did he use period forms because they seemed just the symbols needed? Was he impelled to modify old forms to fit new needs or new materials, or was he driven by the itch for novelty? Did he evolve a new pattern to harmonize with,—but not to imitate,—the airplane, the subway, the grain elevators, the traffic lights, the radio of these United States, or did he turn to Yucatan and to the Congo to escape an over-familiarity with Rome?

SKYSCRAPER GARAGES AND CONGESTION

BY

HARVEY WILEY CORBETT

WHETHER or not our metropolitan office buildings should be equipped with garages is a question that can be satisfactorily determined only when it is considered from the viewpoint of city planning. Indeed, when thinking of any innovation that concerns the use or the size of even a single building in our already congested urban centers, the architect must be to some degree governed by its effect on the city and the city's growth. This is particularly true when the innovation is of such far-reaching consequence as that of incorporating garages in our skyscrapers.

Obviously, in giving an office building a garage, two fundamental requirements would have to be fulfilled,—(1) it would have to increase convenience for all concerned; (2) it would have to be a profitable investment for the owner of the building. Possibly I have reversed the order in which the architect would have to think of these requirements, but certainly in the problem before us the success of the second would depend upon that of the first. At all events, the architect would have to find means of satisfying both. He would have to ask himself: What is going to be the result of my bright idea on traffic? On owners of automobiles who take them to their work? On pedestrians? How is the garage going to affect the value of the space the building represents? Is it going to pay a satisfactory return on the money invested? Let us consider these elements, then, in something of this order, and it may be we shall decide that the place for a garage is not in an office building at all, but somewhere else.

Suppose we had garages in our principal skyscrapers, how would our cities be affected? Unless we had a new system of streets as well, it is safe to say that we would all be looking back at traffic as we know it now, and regarding it with all the fondness with which some among us think of heavy cornices and classic columns. Consider, for a moment, what it would mean in downtown Manhattan, or the Loop district of Chicago, or anywhere near 42nd Street, New York, if at morning, noon and night we had a stream of motorists as well as pedestrians entering and leaving the tall buildings.

Some of our largest buildings are said to accommodate approximately 30,000 persons. Without actually counting noses, it is of course impossible to be precise, but, estimating roughly, those consulted have thought 1,000 as a reasonable number to take for the occupants of such a building who would ride to work in their own cars, and there is scant likelihood of this figure not being large enough. That leaves 29,000 persons, just in the building in which the garage is located, not counting those in neighboring buildings, who would be seriously inconvenienced twice a day, and to a less extent at noon, and all for the benefit of 1,000 persons who might ride to work in their own cars.

But would these 1,000 owners and daily users of automobiles really benefit by having a garage in the same building as their offices? The terrific congestion at morning and at night would certainly delay them, and could hardly be expected to improve their tempers during the hours following. It is inconceivable that our present streets and traffic system could absorb in the time necessary (let alone desirable) an additional stream of 1,000 automobiles from any given point in the heart of one of the already congested districts. And if they could it is not to be believed that men from choice would twice daily become part of the slowly, periodically advancing stream.

Nevertheless, assuming that all these factors could be satisfactorily adjusted, would installing a garage in a modern office building be a profitable investment? The primary reason for having skyscrapers is to concentrate the business population. By increasing the number of stories one increases the amount of salable space above a given area of land. Space is space, and ever since last fall dollars have been very much dollars. Rentable space must yield a satisfactory return above its production cost. Men must have non-rentable elevators and public halls by which to reach their offices. Similarly, automobiles would require runways and other means of access to their garages. Again it is safe to say that the space occupied by a car in its garage plus the accessory space necessary to get it there would equal that of a normal office, but that financially the return on the space devoted to the automobile would be far less than that on the space given over to the office. Yet, without burrowing into the ground (in itself an expensive method), the installation of a garage in an office building would inevitably displace a proportionate number of offices.

Before suggesting a possible means of relating garages to office buildings, it might be well to consider briefly the advantageous uses to which automobiles are put by office workers in connection with their business. These are principally two,—arriving at and returning from their work. A third, that of moving about relatively short dis-

tances during the day, is mainly the result of our present lack of convenient facilities for pedestrians. If pedestrians could move about undelayed by vehicular traffic and undisturbed by rain, many taxicabs and private cars would disappear from the congested districts of our cities. Motors in these districts would then serve their proper purposes,—transportation of merchandise and the carrying of passengers on urgent errands. Traffic would be speeded up, and walking would resume its normal function as a thoroughly satisfactory method of moving from one place to another.

In considering the correlation of office buildings and garages, the architect must, as has been shown, from the point of view of both the city and his imaginary client, think first in terms of space. A man walking occupies at most 10 square feet. An automobile occupies 100 square feet standing still and 400 when in movement. Decidedly, for both city and investor, the best location for the garage is where the additional space occupied by the automobile can best be spared. Moreover, in the interest of both users and nonusers of private automobiles and, subsequently, that of the garage, the architect's problem becomes one of so adjusting the motor and pedestrian traffic that each suffers the minimum of inconvenience. There can be no doubt that ultimately the only satisfactory solution of the traffic problem will prove to be complete separation of pedestrians and motors. It is toward this goal, therefore, that the architect of the correlated office building and garage should strive. The solution of the problem thus becomes a matter of separating the office building and garage by a not inconvenient distance, and connecting them by walkways along which the owners of automobiles can move freely, undelayed by motor traffic.

This plan would leave the giant office buildings entirely free for what they are intended,—concentrated business centers where as many people as possible, without sacrificing necessary light and air, are brought into close contact with one another. Under it the garage would not be required to pay the cost of valuable space in a highly valuable business center, but would have a position on less valuable land at the edge of the business district. The garage itself might serve one office building or several; it might be a tall building or it might be constructed in whole or in part underground, although the second method would of course be less economical; no matter what form it took, however, the city planner would connect it by covered walkways with the building or the district that it served. The garage, too, would preferably be located at a point adjacent to a big motor traffic avenue up or down which the users of the garage could proceed rapidly, unhampered by pedestrians.

Under such an arrangement, the theory of zoning cities horizontally would be carried out more logically with respect to traffic, and traffic as every architect and certainly every pedestrian knows, is a prime evil in every large city today. The concentrated business zone would be left free for business. Covered walkways would, in fact, obviate not only the automobiles belonging to occupants of the office buildings, but many taxicabs as well. We have noted that the principal use of private cars is in getting to and from business. Taxicabs are chiefly used in bad weather; it is on rainy days that one has difficulty in finding an empty cab and that the worst traffic jams occur; in fair weather the greater part of the business population walks. Give pedestrians protection against rain, and against delays at street crossings, and they will remain pedestrians from choice. Congestion is relieved, traffic is speeded up, convenience is increased all at the same time.

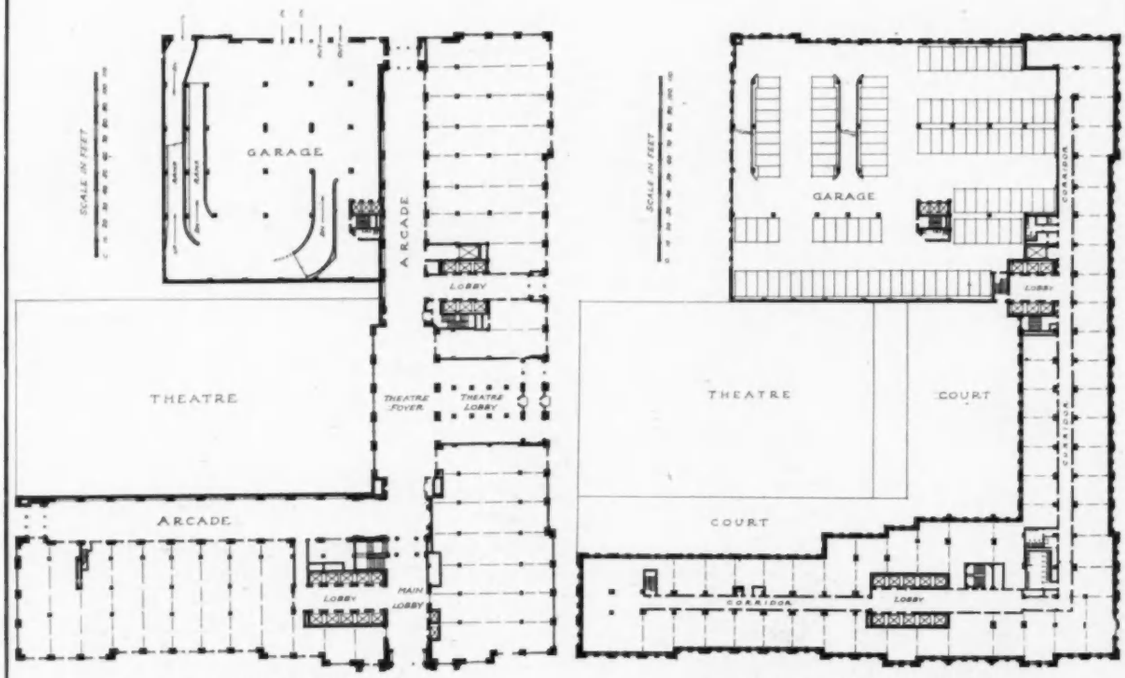
Elsewhere in this issue of THE ARCHITECTURAL FORUM, I have indicated the possibility of cities of the future being zoned vertically instead of horizontally as at present. This simply means that urban populations would be distributed according to function in layers in huge buildings rising from bases that occupy at least a city square, rather than being distributed in patches throughout the urban areas as they are today. It is, in short, one method of achieving maximum convenience while satisfying the increasing demand for concentration. Should cities ever be so planned, arcaded walkways would inevitably be an integral part of the design; only instead of there being but one system there would of necessity be several on different levels (for the different classes of pedestrian traffic,—business, shopping, pleasure), and those on corresponding levels of neighboring buildings would be connected by bridges above the avenues and cross streets. In such cities, motor traffic too might be divided into classes, and the bottom level here would be completely free for services. The proposed scheme for connecting garages with office buildings would lend itself to fuller and even more satisfactory development in such a plan. The incorporating of a garage in one of the unit buildings, on the other hand, would produce even more hopeless confusion than it would in our existing cities.

The task confronting the modern architect is that of thinking of his own buildings, and his own ideas for them, in relation to the city as a whole and to its future development. And with regard to the second part of this task, it should not be forgotten that the question for discussion tomorrow may not be how to provide office buildings with garages, but how best to establish landing stages, mooring masts, and aviation beacons on the towers of tall buildings.

Drix Duryea

FISHER BUILDING, DETROIT
ALBERT KAHN, INC., ARCHITECTS

UNIV. OF MICH.



FIRST FLOOR

FIFTH TO NINTH FLOORS

CONSTRUCTION DATA

Rentable Area: Offices, 310,000 sq. ft. Stores, 440,000 sq. ft.

Cubic Contents: 14,000,000 ft.

Date of Completion: 1929.

Structural Frame: Structural steel; garage section, reinforced concrete.

Structural Floor System: Steel tile and concrete joist.

Fireproofing: Concrete for beams and tile for columns.

Heating: Vacuum steam.

Ventilation: Important sections ventilated and cooled.

Elevators: Inductor leveling, pre-registered signal.

Lighting: Direct and indirect.

Radiators: Copper.

Plumbing: Water supply pipe, wrought iron galvanized.

Office Floors: Rubber tile.

Office Walls: Plaster and paint.

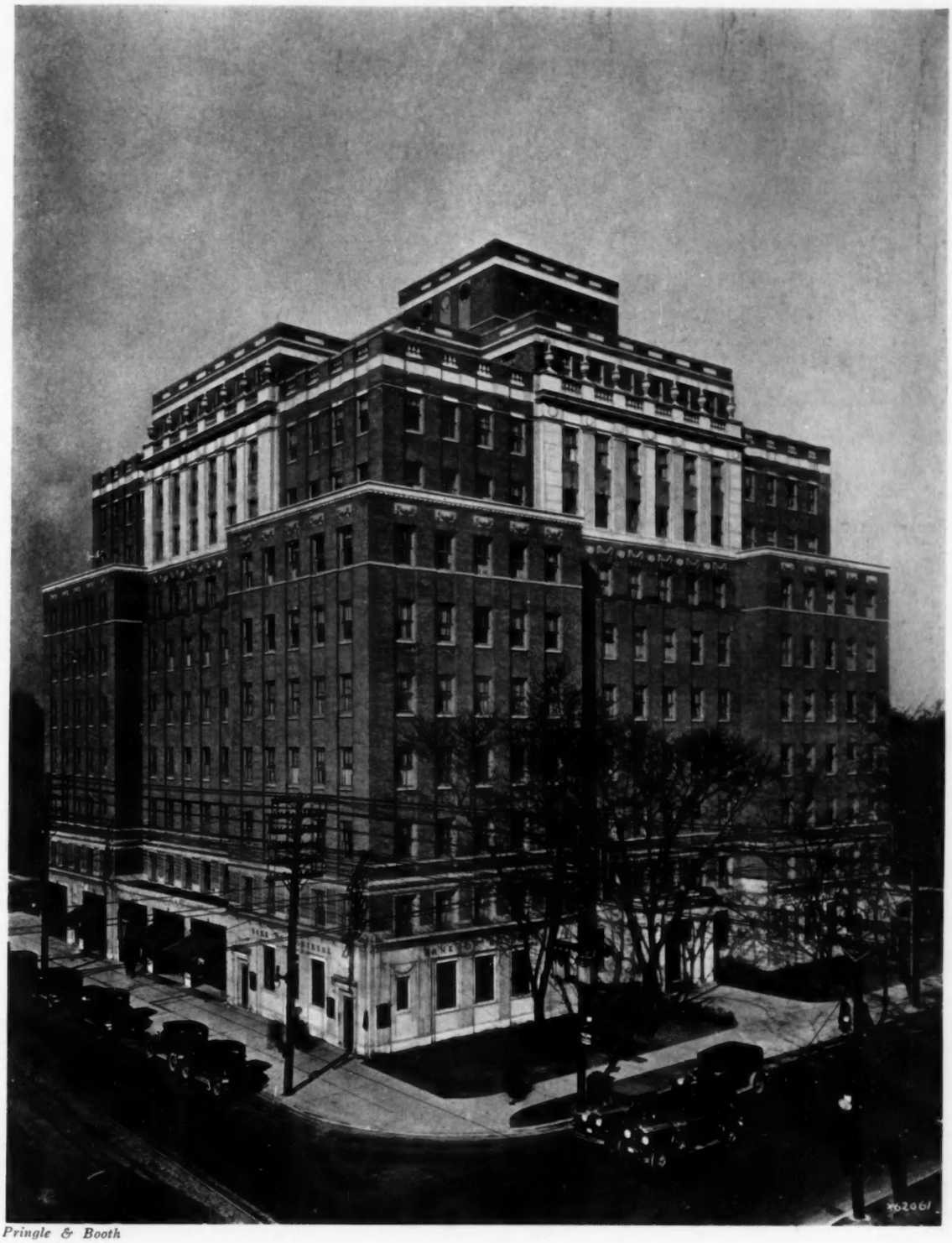
Office Partitions: Tile and plaster.

Corridor Floors: Rubber tile.

Windows: Double-hung bronze.

Trim: American walnut.

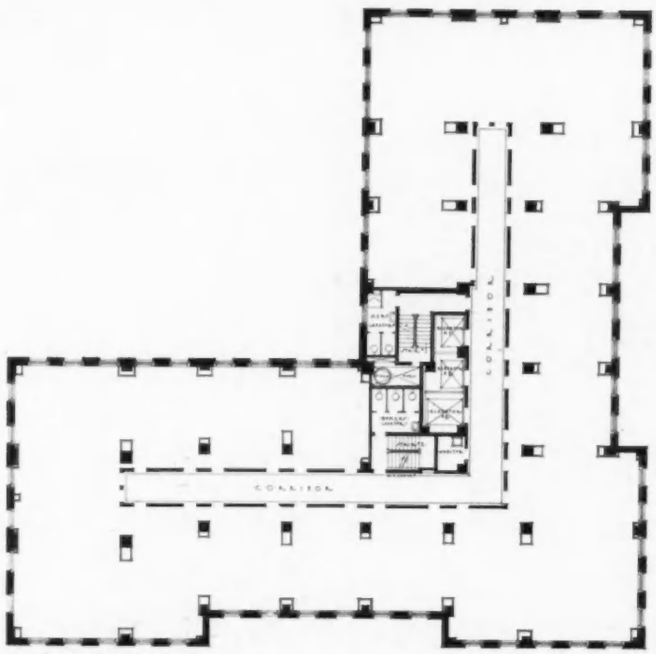
FISHER BUILDING, DETROIT
ALBERT KAHN, INC., ARCHITECTS



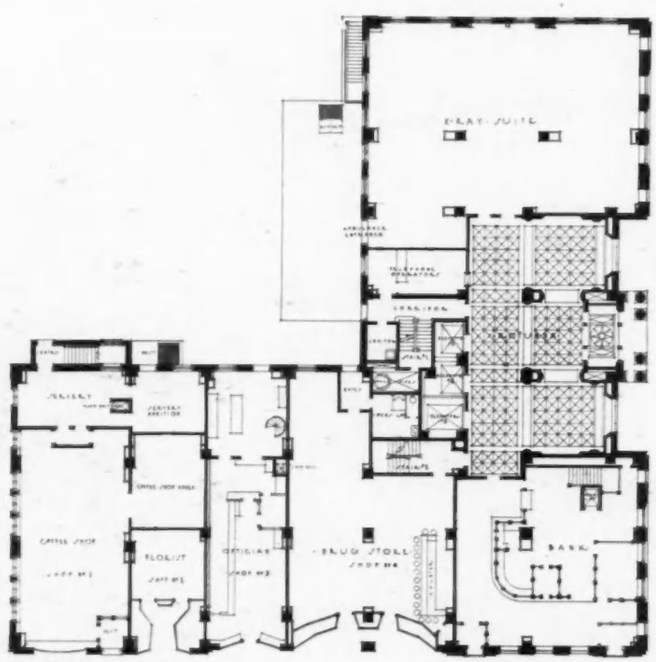
Pringle & Booth

MEDICAL ARTS BUILDING, TORONTO
MARANI & LAWSON, ARCHITECTS

UNIV OF MICH



A TYPICAL FLOOR



GROUND FLOOR

COST AND CONSTRUCTION DATA

Rentable Area: 83,000 sq. ft.—office space, 77,037 sq. ft.; store space, 5,963 sq. ft.

Total Cost of Building: $900,000 (exclusive of land).

Date of Completion: October 1st, 1929.

Cubic Contents: 1,555,000 cu. ft.

Cubic Foot Cost: $.60.

Structural Frame: Reinforced concrete.

Structural Floor System: Concrete joists, tin pan.

Heating: Differential vacuum.

Ventilation: exhaust.

Elevator Type: 500 ft. manual micre leveling.

Lighting Type: Direct.

Radiator Type: Cast iron.

Plumbing: Water Supply Pipe—hot water, brass; cold water, G. W. I.; cast iron soil pipe.

Office Floors: Linoleum.

Corridor Floors: Linoleum.

Office Partitions: Movable.

Office Walls: Plaster painted.

Trim: Birch.

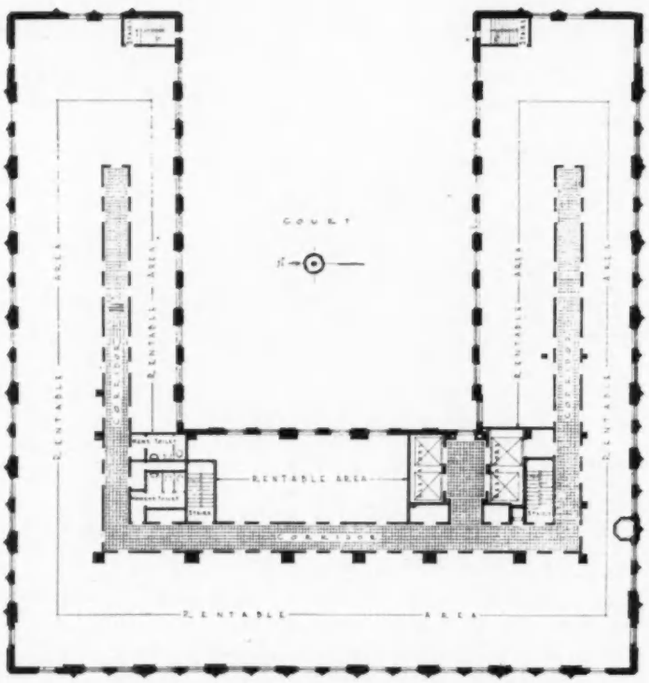
Windows: Double hung wood, weather-stripped.

MEDICAL ARTS BUILDING, TORONTO. MARANI & LAWSON, ARCHITECTS. ANGLIN-NORCROSS, LIMITED, GENERAL CONTRACTOR

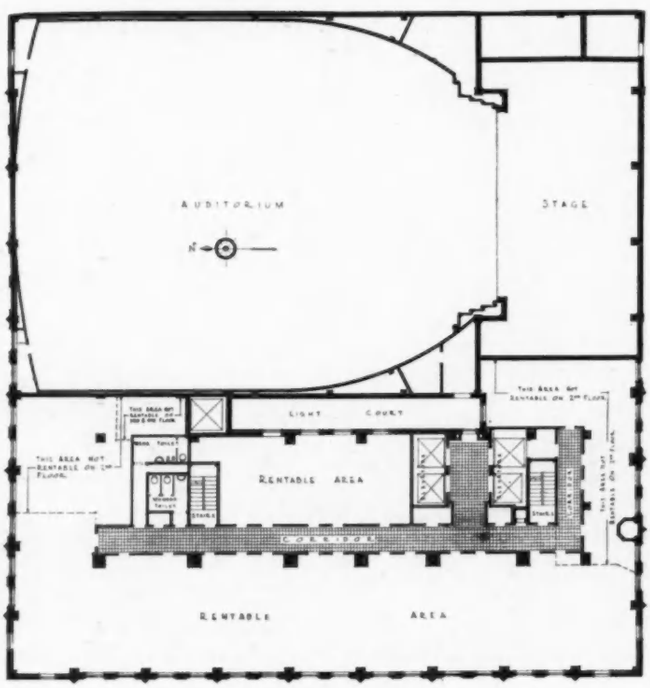
Macdonald

STUART BUILDING, LINCOLN, NEB.
DAVIS & WILSON, ARCHITECTS

UNIV. OF MICH.



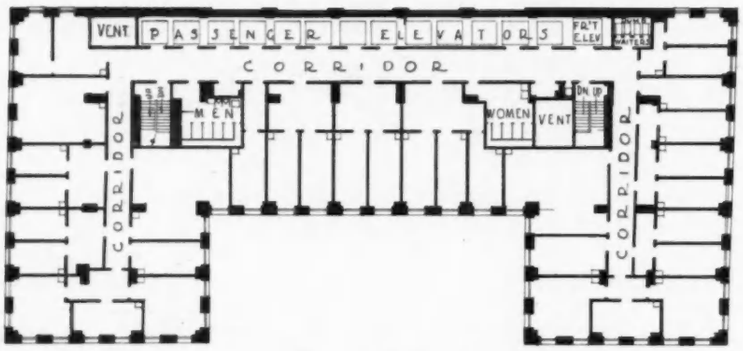
7TH TO 10TH FLOORS



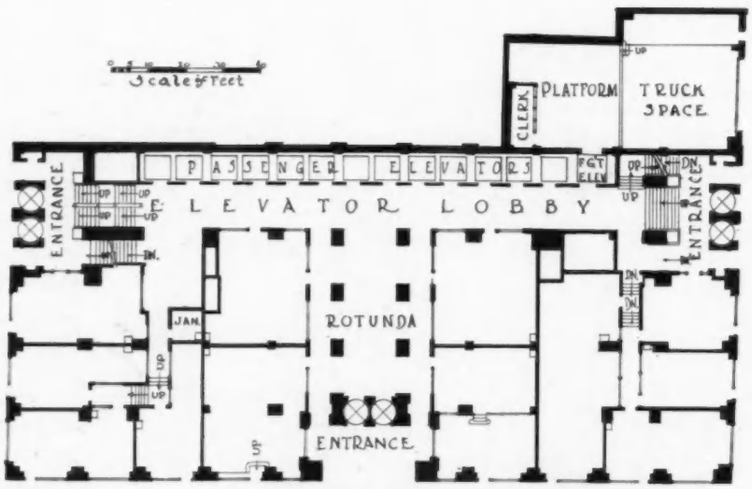
2ND TO 6TH FLOORS

STUART BUILDING, LINCOLN, NEB.
DAVIS & WILSON, ARCHITECTS

KOPPERS BUILDING, PITTSBURGH. GRAHAM, ANDERSON, PROBST & WHITE, ARCHITECTS

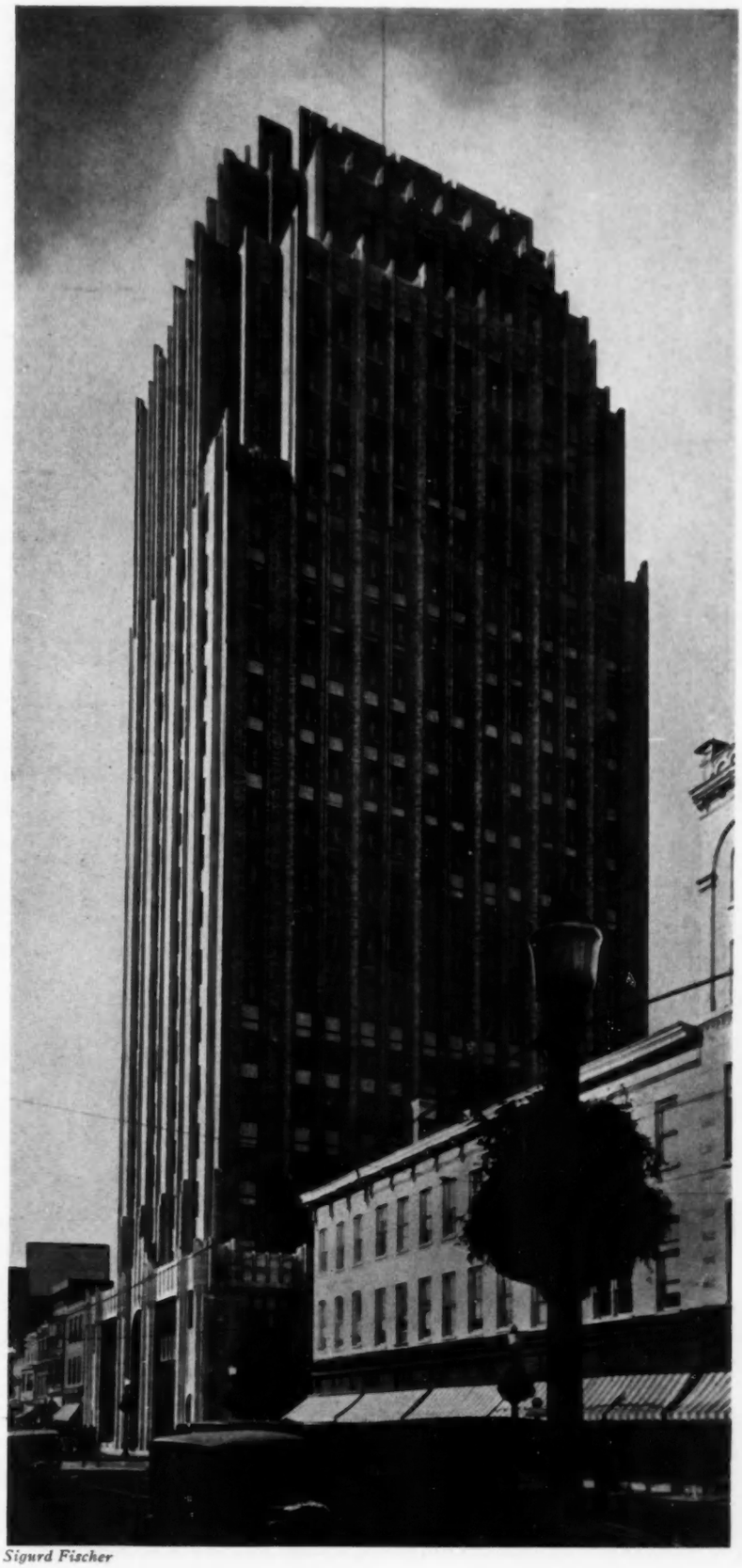


11TH TO 20TH FLOORS



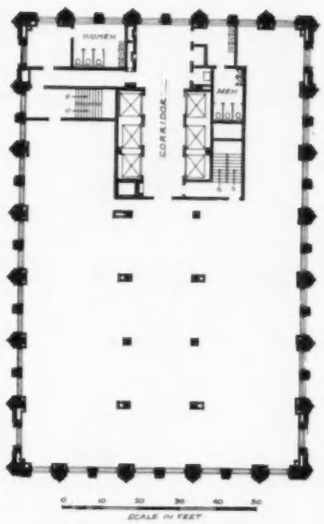
FIRST FLOOR

KOPPERS BUILDING, PITTSBURGH.
GRAHAM, ANDERSON, PROBST & WHITE, ARCHITECTS

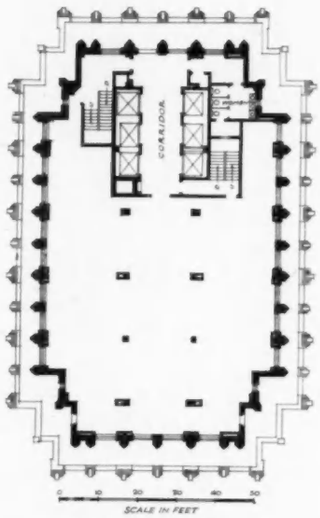


BUILDING FOR PENNSYLVANIA POWER & LIGHT CO., ALLENTOWN. HELMLE & CORBETT, ARCHITECTS

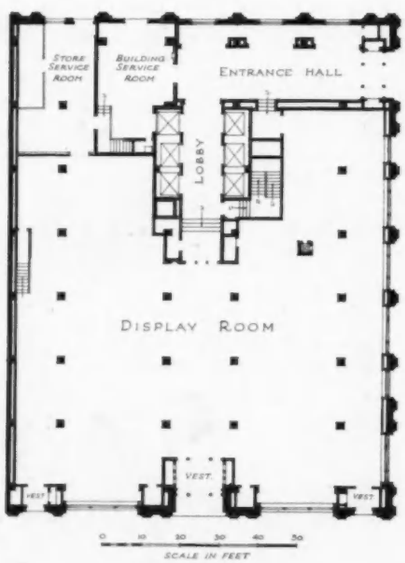
Sigurd Fischer



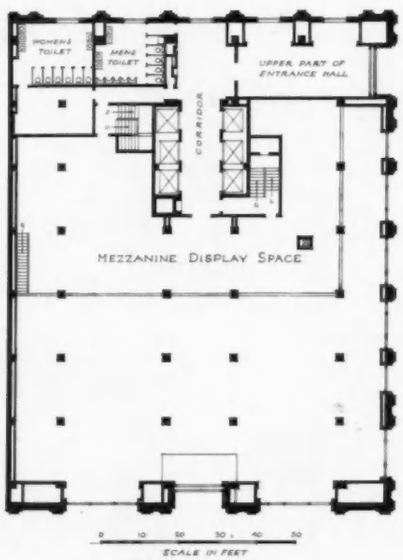
4TH TO 16TH FLOORS



21ST TO 22ND FLOORS



FIRST FLOOR



MEZZANINE

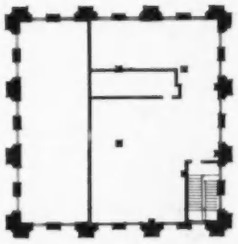
CONSTRUCTION DATA

Date of Completion: 1927.
Structural Frame: Steel.
Structural Floor System: Cinder arches.
Fireproofing: Terra cotta block.
Heating: Steam.
Plumbing: Soil pipe, cast iron.
Office Floors: Linoleum.
Office Walls: Painted.
Office Partitions: Wood.
Corridor Floors: Terrazzo.
Windows: Double-hung.
Trim: Steel.

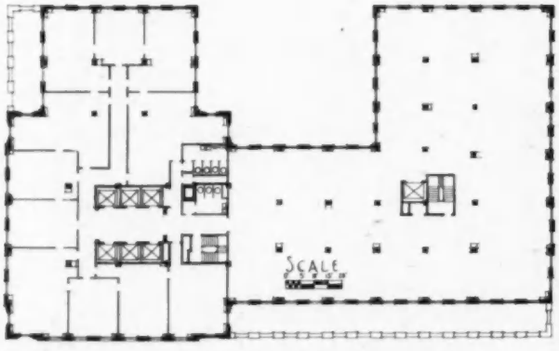
BUILDING FOR PENNSYLVANIA POWER & LIGHT CO., ALLENTOWN. HELMLE & CORBETT, ARCHITECTS

BUILDING FOR THE R. J. REYNOLDS
TOBACCO CO., WINSTON-SALEM, N. C.
SHREVE & LAMB, ARCHITECTS

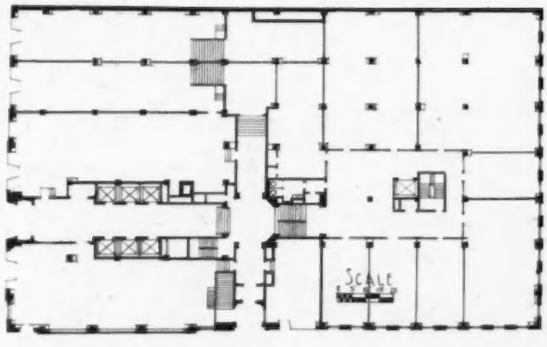
UNIV. OF MICH.



PENT HOUSE



A TYPICAL FLOOR



GROUND FLOOR

CONSTRUCTION DATA

Rentable Area: 232,458 sq. ft. — office space, 197,410 sq. ft.; store space, 17,-833 sq. ft.

Cubic Contents: 3,939,841 cu. ft.

Date of Completion: March, 1929

Structural Frame: Steel skeleton

Structural Floor System: Tin-pan reinforced concrete

Fireproofing (material): Concrete on beams and girders, hollow tile on columns

Heating: Vapor modulation

Ventilation: Mechanical ventilation of toilets, restaurant, barber shop, etc.

Elevator Type: Electric, with full signal control

Lighting Type: Electric

Radiator Type: Cast iron

Plumbing: Brass water supply pipe, cast iron soil pipe

Office Floors: Terrazzo

Corridor Floors: Terrazzo

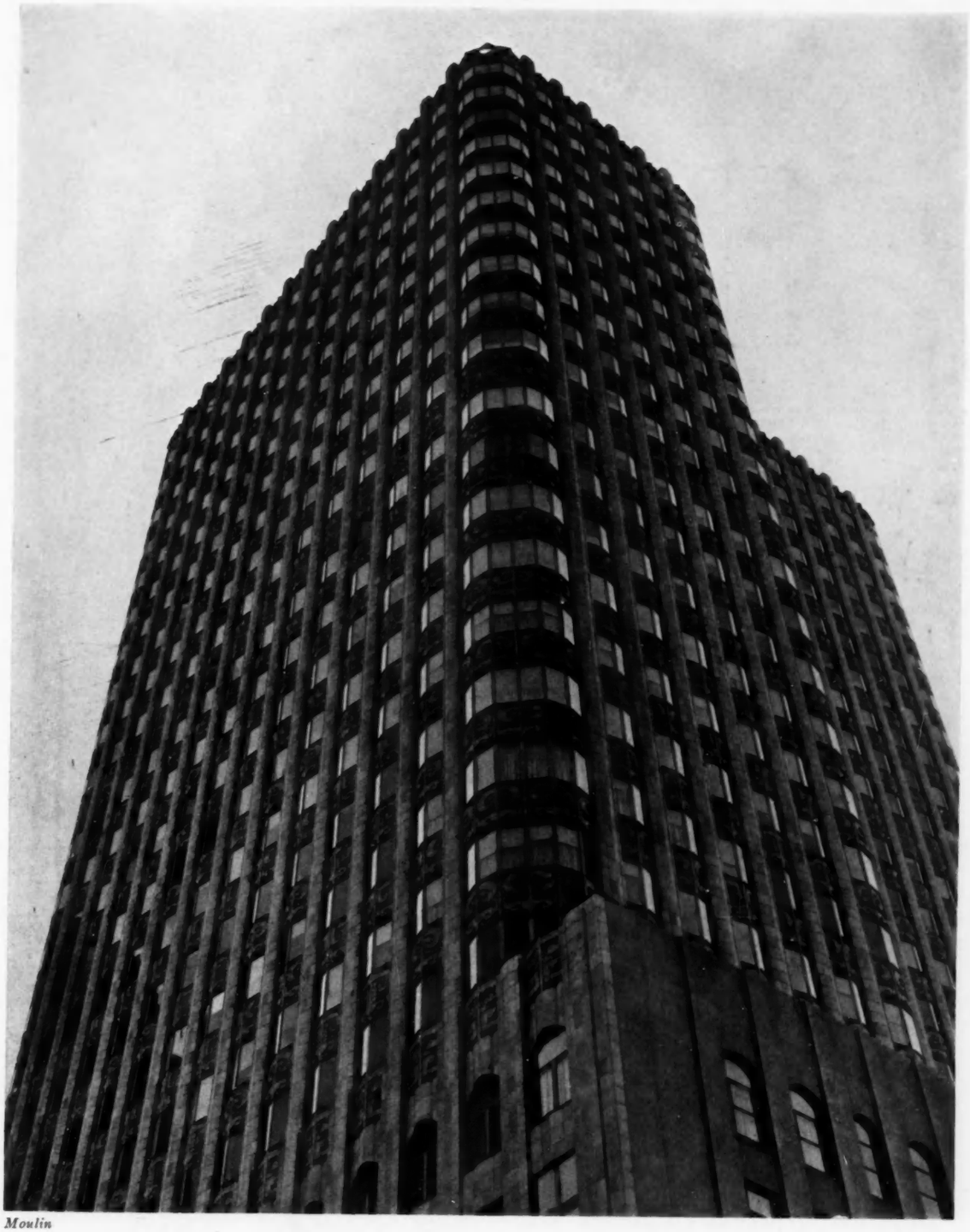
Office Walls: Hollow tile

Office Partitions: Wood

Windows: Metal

Trim: Hollow metal

BUILDING FOR THE R. J. REYNOLDS TOBACCO CO., WINSTON-SALEM, N. C.
SHREVE & LAMB, ARCHITECTS



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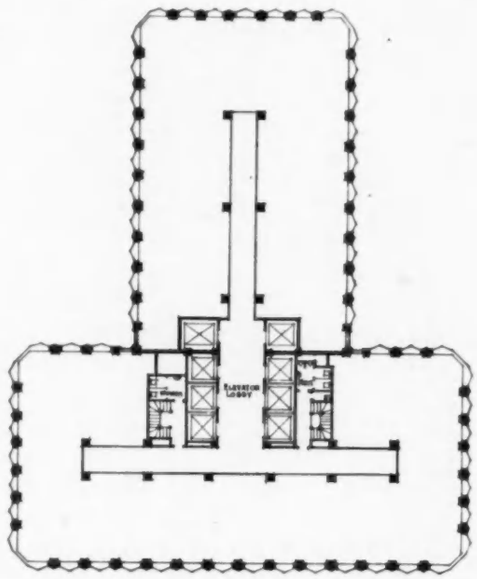
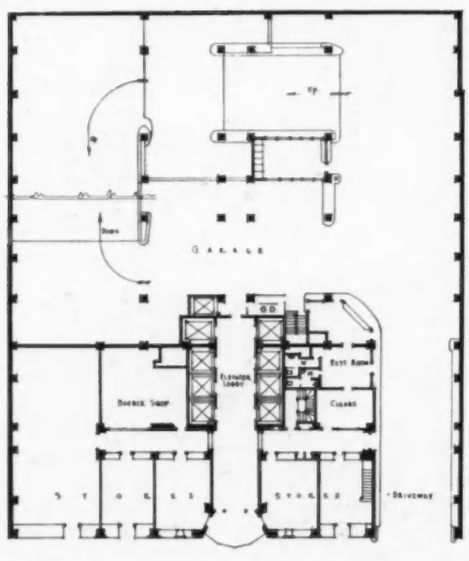
FOUR-FIFTY SUTTER BUILDING, SAN FRANCISCO
J. R. MILLER & T. L. PFLUEGER, ARCHITECTS

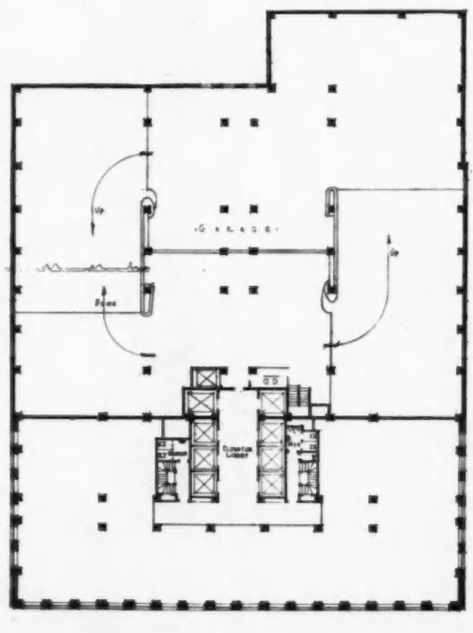
UNIV. OF MICH.



A TYPICAL PROFESSIONAL FLOOR

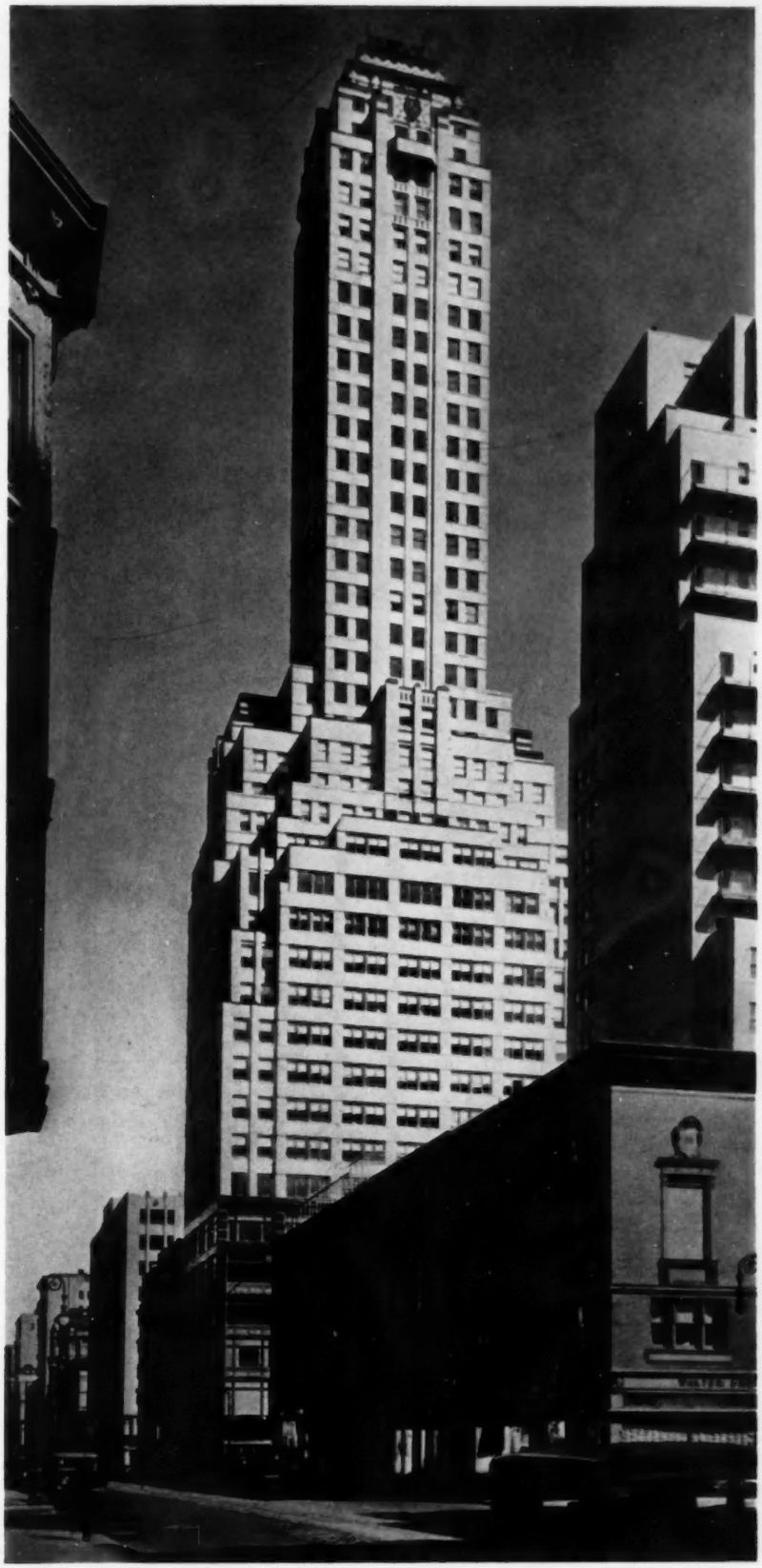


GROUND FLOOR



A TYPICAL COMMERCIAL OFFICE AND GARAGE FLOOR

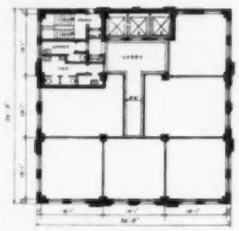
FOUR-FIFTY SUTTER BUILDING, SAN FRANCISCO.
J. R. MILLER & T. L. PFLUEGER, ARCHITECTS



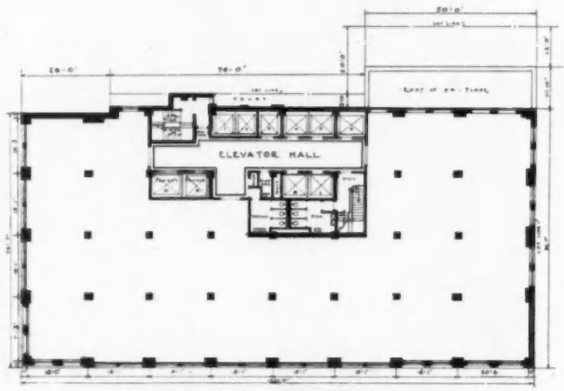
FULLER BUILDING, NEW YORK. WALKER & GILLETTE, ARCHITECTS

Sigurd Fischer

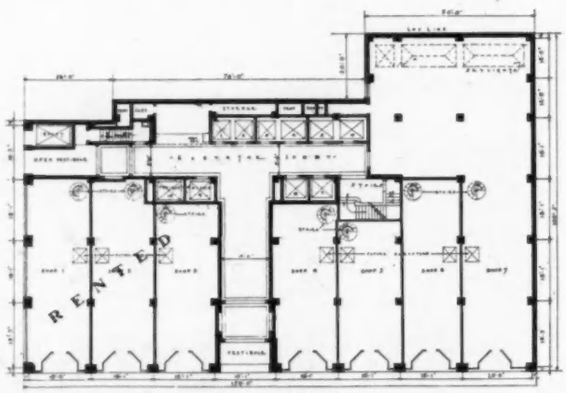
UNIV. OF MICH.



22ND TO 26TH FLOORS



9TH AND 10TH FLOORS



FIRST FLOOR

CONSTRUCTION DATA

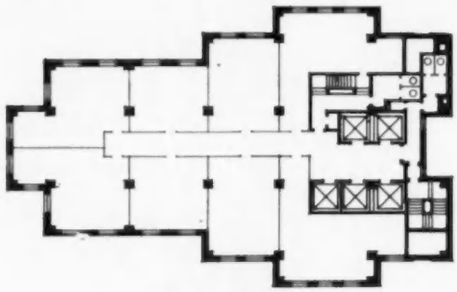
Rentable Area: 209,492 sq. ft.
Cubic Centers: 3,752,168 ft.
Date of Completion: September 7, 1929.
Structural Frame: Steel.
Structural Floor System: Short span cinder up to and including 22nd floor; long span two-way floor block system above.
Fireproofing: Terra cotta.
Heating: Two-pipe vacuum steam.
Ventilation: Mechanical for toilet rooms and interior spaces.
Elevators: Full signal control, gearless traction.
Lighting: Alternating current supplied to all outlets through rigid conduit, low-tension systems through steel underfloor duct.
Radiators: Copper.
Plumbing: Water supply pipe, brass; soil pipe, cast iron underground, genuine galvanized wrought iron above ground.
Office Floors: Cement.
Office Walls: White plaster, painted.
Office Partitions: Steel and glass.
Corridor Floors: Marble and terrazzo.
Trim: Hollow metal.

FULLER BUILDING, NEW YORK.
WALKER & GILLETTE, ARCHITECTS

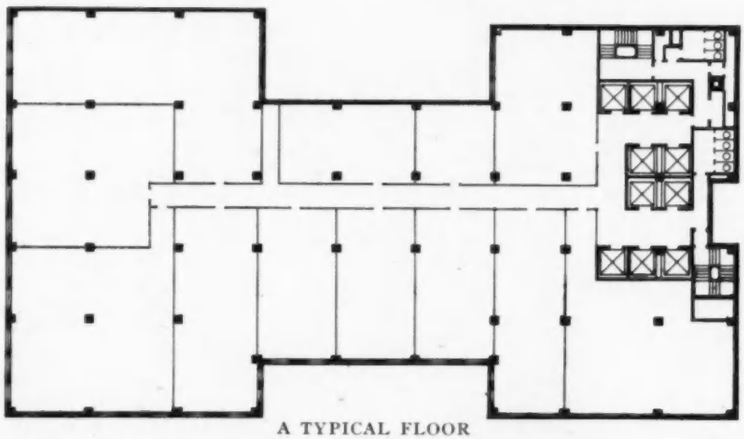
LEFCOURT - NATIONAL BUILDING, NEW YORK
SHREVE & LAMB, ARCHITECTS

Sigurd Fischer

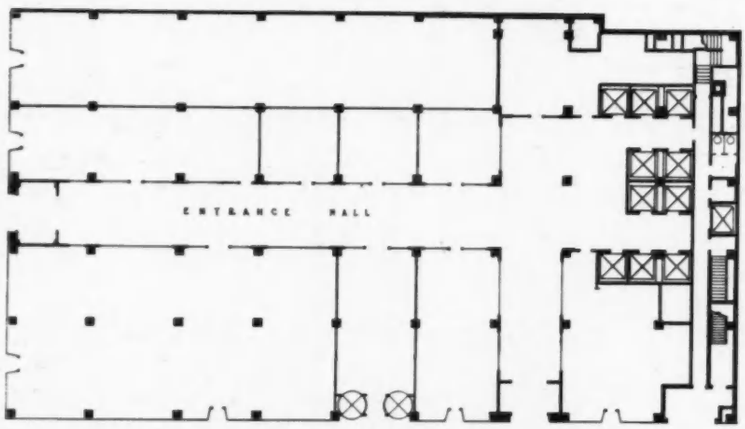
UNIV. OF MICH.



TOWER FLOOR



A TYPICAL FLOOR



GROUND FLOOR

CONSTRUCTION DATA

Rentable Area: Offices, 354,900 sq. ft.; Stores, 36,690 sq. ft.
Cubic Contents: 5,311,000 ft.
Date of Completion: April, 1929.
Structural Frame: Steel.
Structural Floor System: Reinforced cinder concrete.
Fireproofing: Columns, brick and hollow tile; floor, steel and cinder concrete.
Elevators: Full signal control.
Office Floors: Cement.
Office Walls: Plaster.
Office Partitions: Plaster.
Corridor Floors: Terrazzo.
Windows: Steel.
Trim: Steel.

LEFCOURT-NATIONAL BUILDING, NEW YORK
SHREVE & LAMB, ARCHITECTS

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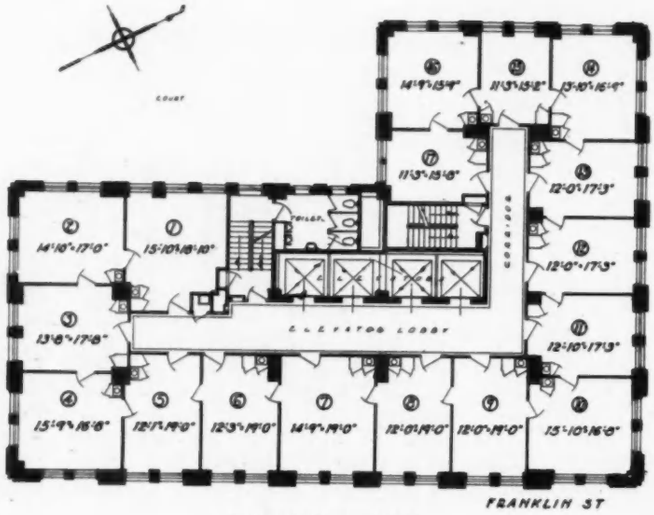
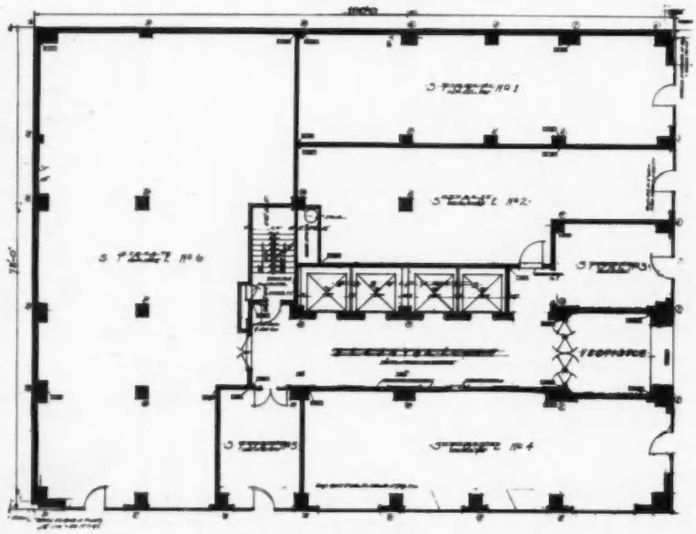
FINANCIAL CENTER BUILDING, OAKLAND, CAL.
REED & CORLETT, ARCHITECTS

UNIV OF MICH



A TYPICAL FLOOR



GROUND FLOOR

COST AND CONSTRUCTION DATA

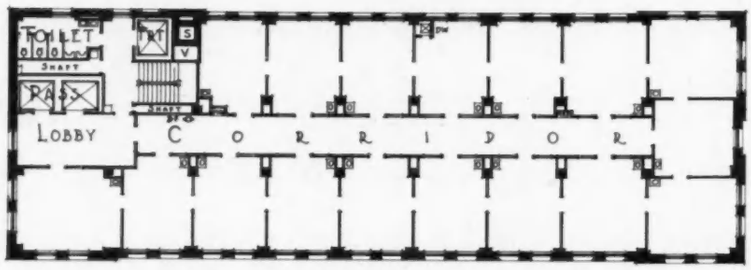
Rentable Area: 60,200 sq. ft.—office space, 54,000 sq. ft.; store space, 6,200 sq. ft.
Cubic Contents: 1,300,000 cu. ft.
Cubic Foot Cost: $.59.
Total Cost of Building (exclusive of land): $770,000.
Date of Completion: February 17, 1930.
Structural frame: Steel.
Fireproofing (material): Concrete.
Structural Floor System: Concrete.
Heating: Two pipe vacuum.
Lighting Type: Enclosing.
Ventilation: Exhaust for toilets.
Radiator Type: Wall-hung cast iron.
Elevator Type: 600 F.P.M. self-leveling.
Plumbing: Iron water supply pipe, cast iron and iron soil pipe.
Office Floors: Linoleum.
Corridor Floors: Marble.
Office Walls: Stippled paint on hard wall plaster.
Office Partitions: T. C. tile.
Windows: Double-hung, wood and metal.
Trim: Philippine mahogany.

FINANCIAL CENTER BUILDING, OAKLAND, CAL.
REED & CORLETT, ARCHITECTS

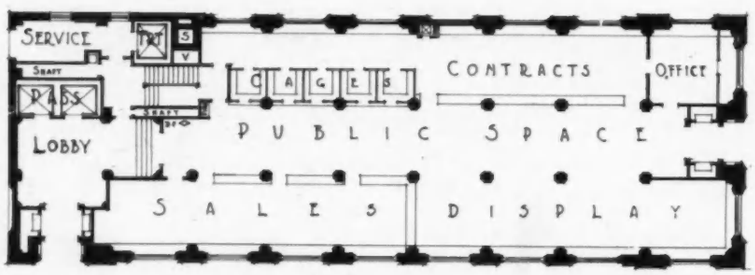
Howards

OKLAHOMA NATURAL GAS
BUILDING, TULSA.
A. M. ATKINSON, ARCHITECT

UNIV. OF MICH.

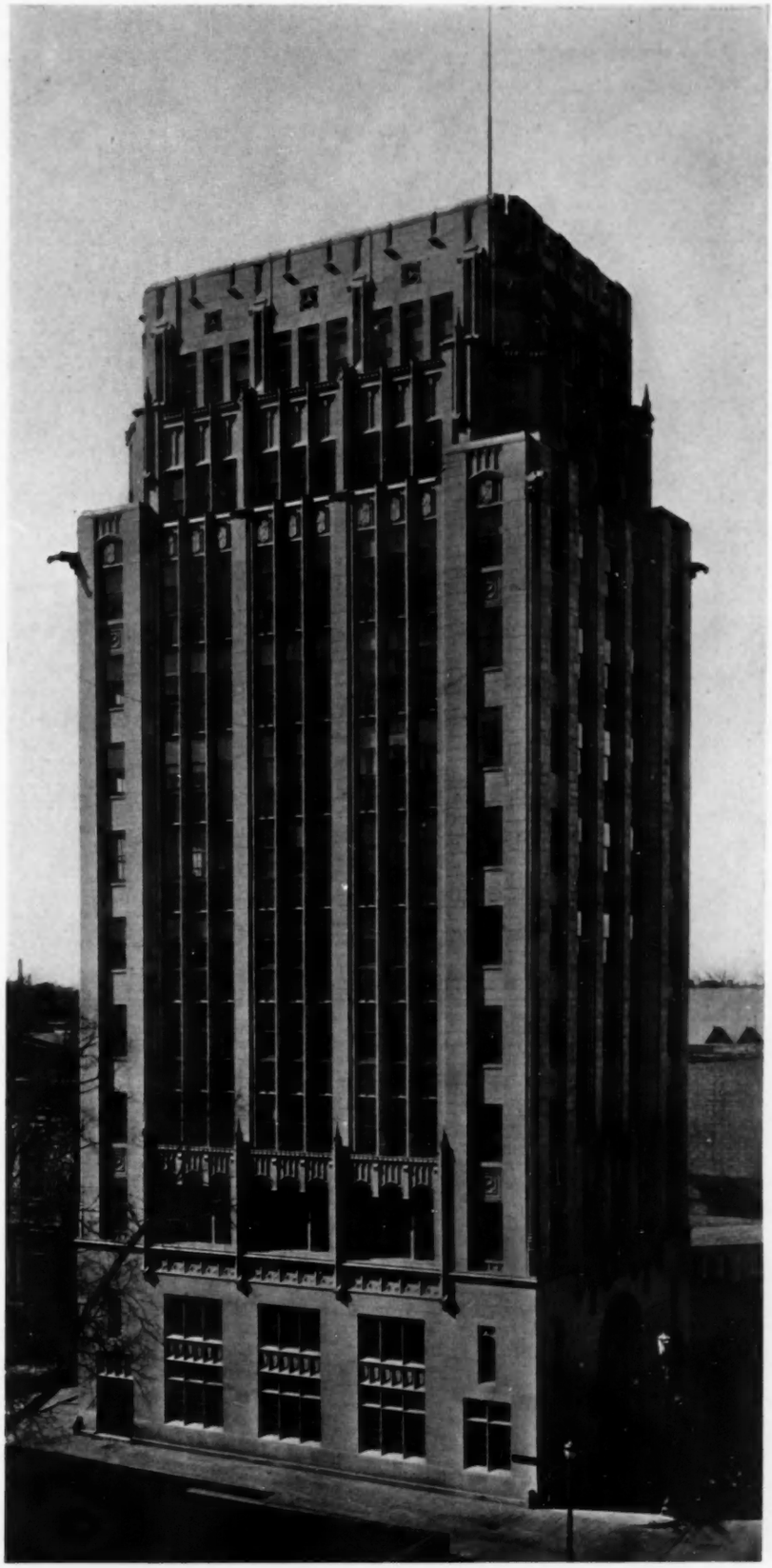


A TYPICAL FLOOR



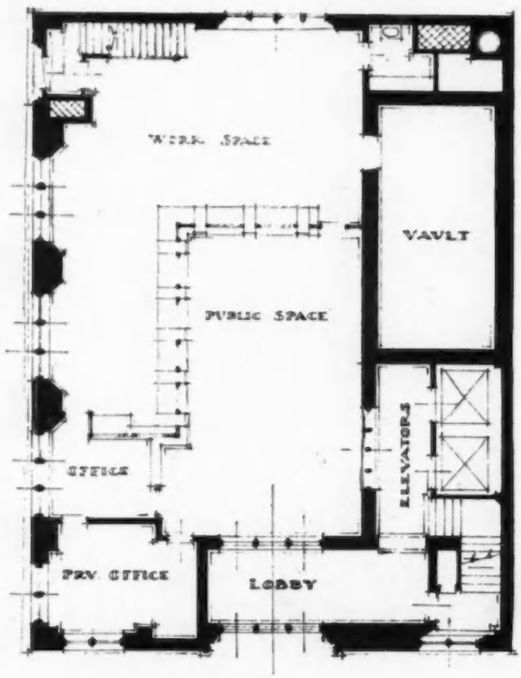
GROUND FLOOR

OKLAHOMA NATURAL GAS
BUILDING, TULSA.
A. M. ATKINSON, ARCHITECT

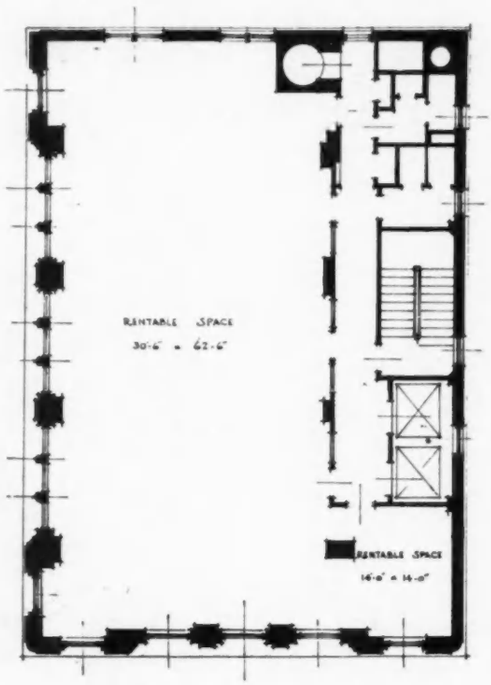


BUILDING AND LOAN ASSOCIATION BUILDING, SOUTH BEND, IND. AUSTIN & SHAMBLEAU, ARCHITECTS

UNIV OF MICH



BANKING ROOM FLOOR



TYPICAL FLOOR

COST AND CONSTRUCTION DATA

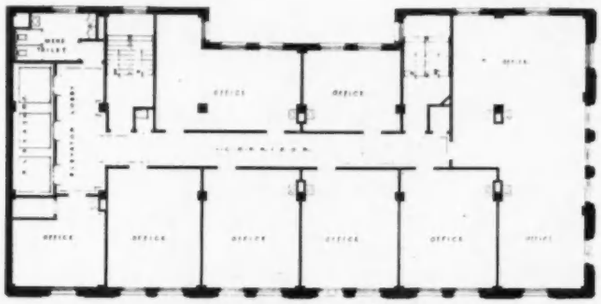
Rentable Area: 24,850 sq. ft.—office space, 20,000 sq. ft.; bank space, 4,850 sq. ft.
Total Cost of Building, exclusive of land: $460,000.
Date of Completion: January 15, 1930.
Cubic Contents: 490,000 cu. ft.
Cubic Foot Cost: $.94.
Structural Frame: Steel.
Fireproofing Material: Concrete and hollow tile.
Structural Floor System: Steel girders encased in concrete, and with concrete and pan floor spans.
Heating: Vacuum, dual central city plant, thermostatic control.
Lighting Type: Outside flood light; ceiling, electric.
Ventilation; Fan in basement for banking rooms only.
Radiator Type: Concealed in banking space, wall-hung slim type in offices.
Elevator Type: Full electric gearless type, automatic electric control.
Plumbing: Wrought iron water supply pipe, wrought iron soil pipe.
Office Floors: Cork tile.
Corridor Floors: Marble, first floor; terrazzo above.
Office Walls: Plastered.
Office Partitions; Gypsum tile.
Windows: Hollow metal.
Trim: Walnut, banking rooms; figured red gum in offices.

BUILDING AND LOAN ASSOCIATION BUILDING, SOUTH BEND, INDIANA.
AUSTIN & SHAMBLEAU, ARCHITECTS

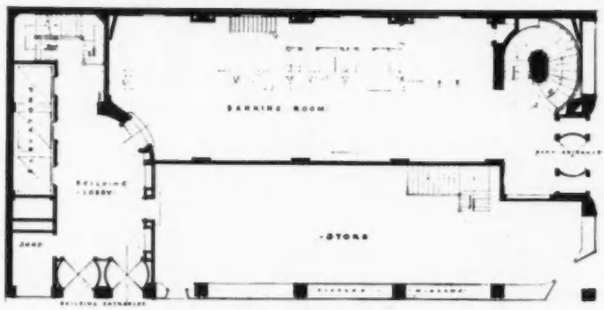
Youngstown Art Engraving Co.

CENTRAL SAVINGS AND LOAN CO.
BUILDING, YOUNGSTOWN, OHIO.
MORRIS W. SCHEIBEL, ARCHITECT.
R. M. JOHNSON, ASSOCIATED

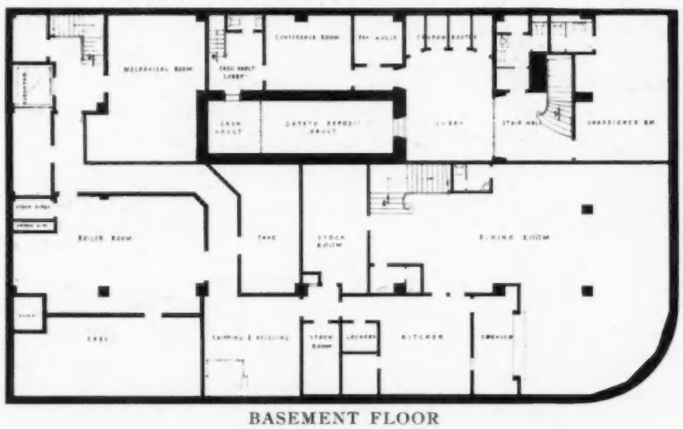
UNIV. OF MICH.



A TYPICAL FLOOR



FIRST FLOOR

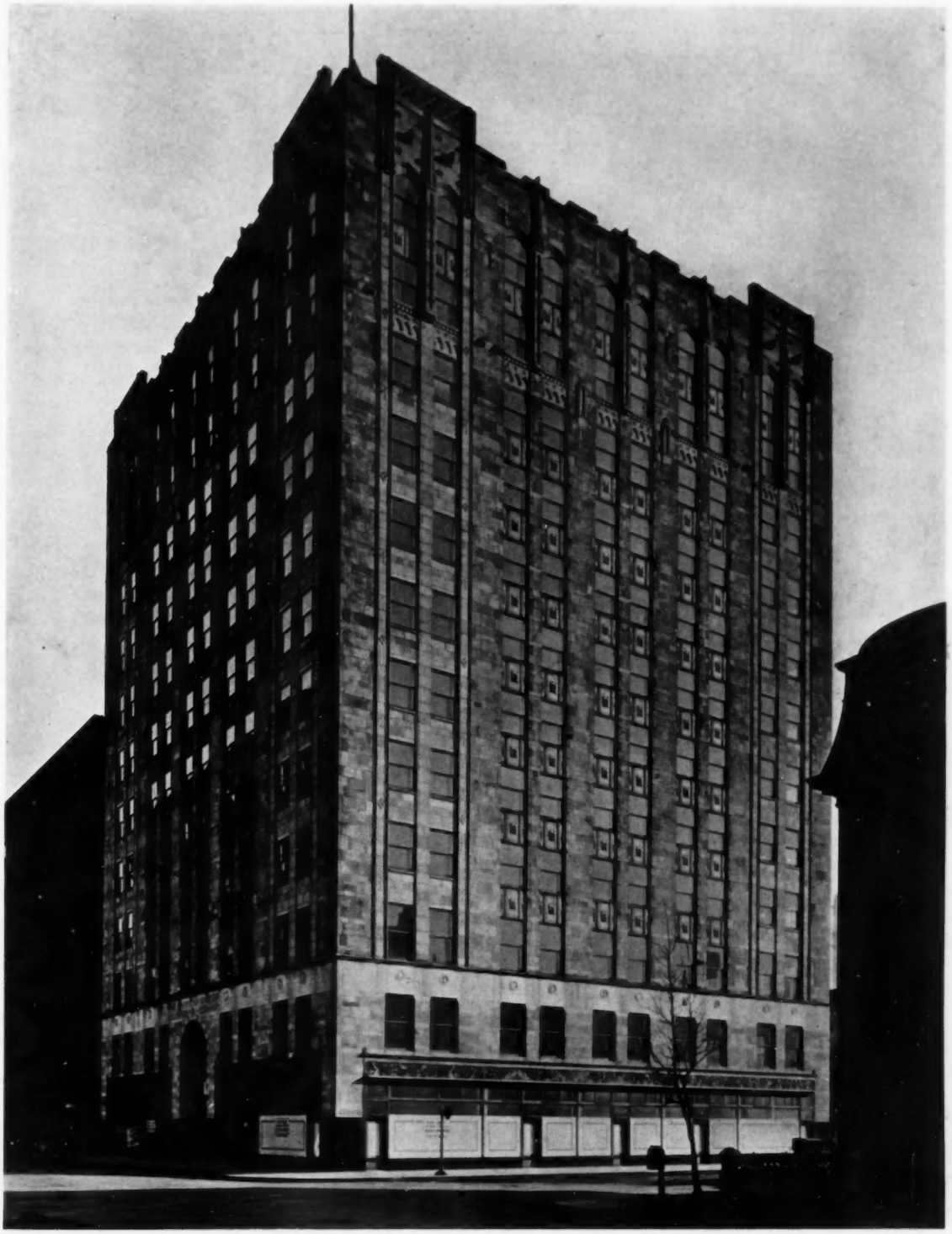


BASEMENT FLOOR

COST AND CONSTRUCTION DATA

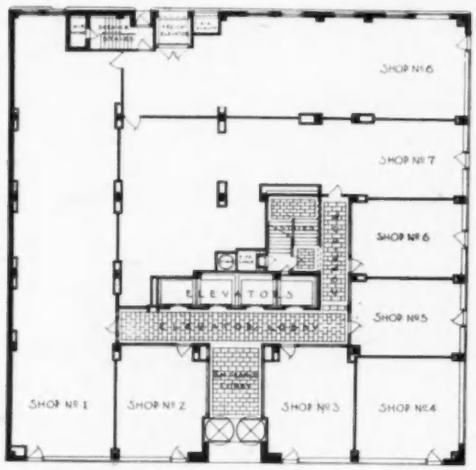
Rentable Area: 74 per cent.
Total Cost of Building, (exclusive of land): $1,000,000.
Cubic Contents: 1,200,000 cu. ft.
Date of Completion: December 20, 1929.
Structural Frame: Steel, and hollow tile fireproofing.
Fireproofing (material): 2-in. concrete.
Structural Floor System: ¾-in. lath and 2½-in. concrete slab; open truss steel joists.
Heating: Steam, and municipal heat.
Lighting Type: Direct in offices.
Ventilation: Mechanical in basement and banking rooms only.
Radiator Type: American.
Elevator Type: Signal control.
Plumbing: Galvanized water supply pipe, steel soil pipe.
Office Floors: Cement.
Corridor Floors and Walls: Travertine stone, entire height.
Office Walls: Sand finished, painted.
Office Partitions: Wood.
Windows: Steel double-hung and wood pivoted.
Trim: Philippine mahogany.

CENTRAL SAVINGS AND LOAN CO. BUILDING, YOUNGSTOWN.
MORRIS W. SCHEIBEL, ARCHITECT; R. M. JOHNSON, ASSOCIATED

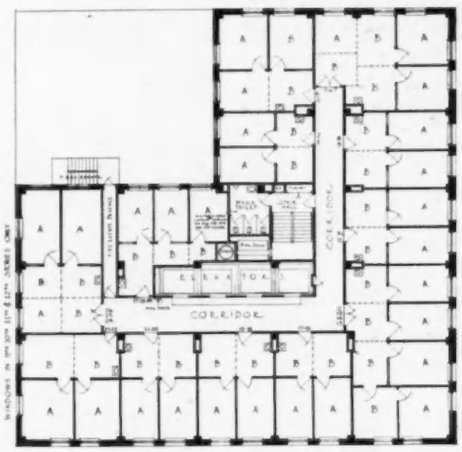


AMERICAN BANKERS' INSURANCE BUILDING.
CHICAGO. CHILDS & SMITH, ARCHITECTS

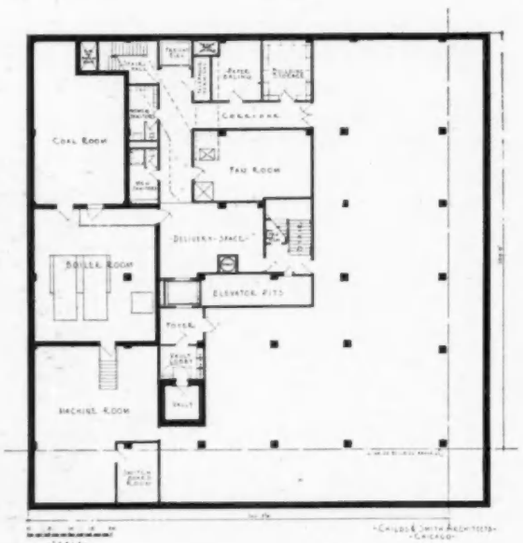
UNIV. OF MICH.



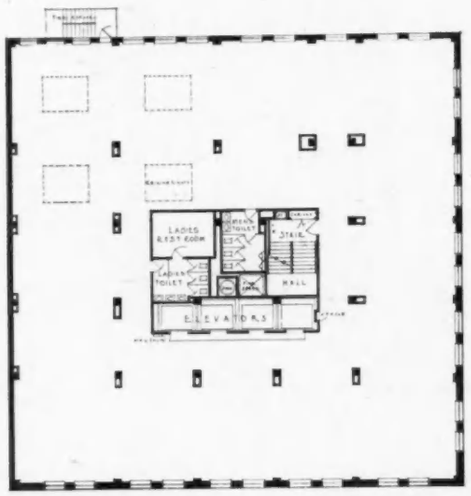
FIRST FLOOR



A TYPICAL FLOOR



BASEMENT FLOOR



THIRD FLOOR

COST AND CONSTRUCTION DATA

Rentable Area: { Office space, 75,330 sq. ft. / Store space, 8,060 sq. ft } – 83,390 sq. ft

Total Cost of Building (exclusive of land): $1,000,000 approximately.

Date of Completion: November 1, 1929.

Structural Frame: Skeleton steel.

Fireproofing Material: Concrete.

Structural Floor System: Reinforced concrete.

Heating: Direct radiators, vacuum system.

Lighting Type: Direct, with enclosing globes.

Ventilation: Supply to basement, 1st, 2nd and 3rd floors; exhaust from toilets.

Radiator Type: Phantom.

Elevator Type: Electric.

Plumbing: Wrought iron water supply pipe, wrought iron soil pipe.

Office Floors: Cement.

Corridor Floors: Marble.

Office Walls: Plaster.

Office Partitions: Clay tile.

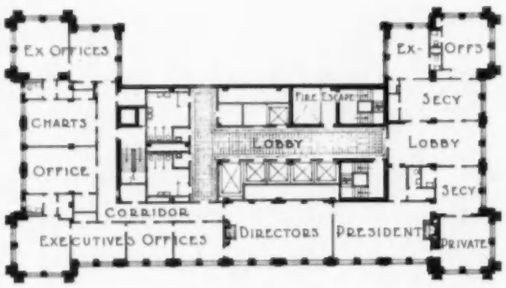
Windows: Double-hung, steel.

Trim: Mahogany.

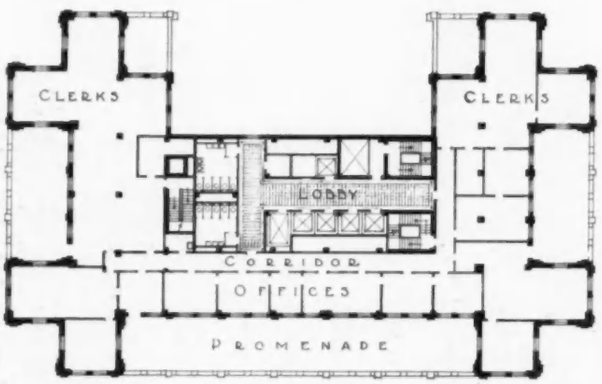
AMERICAN BANKERS' INSURANCE BUILDING, CHICAGO. CHILDS & SMITH, ARCHITECTS

MOUNTAIN STATES TELEPHONE
& TELEGRAPH BUILDING, DENVER.
W. N. BOWMAN, INC., ARCHITECTS

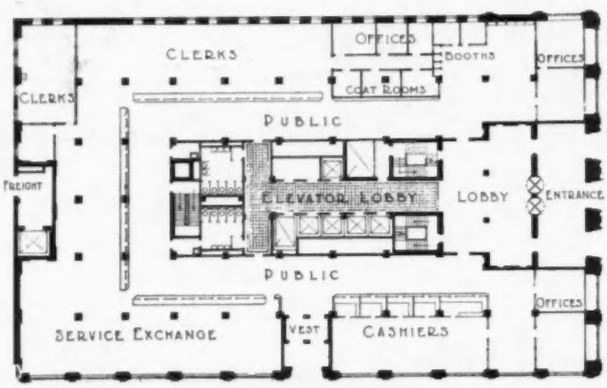
UNIV. OF MICH.



14TH FLOOR



11TH FLOOR



GROUND FLOOR

COST AND CONSTRUCTION DATA

Rentable Area: Mountain States Telephone & Telegraph Company uses entire building.

Cubic Contents: 5,000,000 cu. ft.

Cubic Foot Cost: $.60.

Total Cost of Building (exclusive of land): $3,000,000.

Date of Completion: August 1, 1929.

Structural Frame: Steel.

Fireproofing (material): Concrete.

Structural Floor: Pan system.

Heating: Steam.

Elevator Type: Signal control.

Lighting Type: Electric.

Plumbing: Cast iron soil pipe.

Office Floors: Linoleum.

Corridor Floors: Rubber tile, marble and terrazzo.

Office Walls: Painted.

Office Partitions: Tile and plaster.

Windows: Double-hung steel.

Trim: Birch and walnut.

MOUNTAIN STATES TELEPHONE
& TELEGRAPH BUILDING, DENVER.
W. N. BOWMAN, INC., ARCHITECTS

BUILDING FOR THE OHIO BELL TELEPHONE CO., AKRON.
MILLS, RHINES, BELLMAN & NORDHOFF, INC., ARCHITECTS

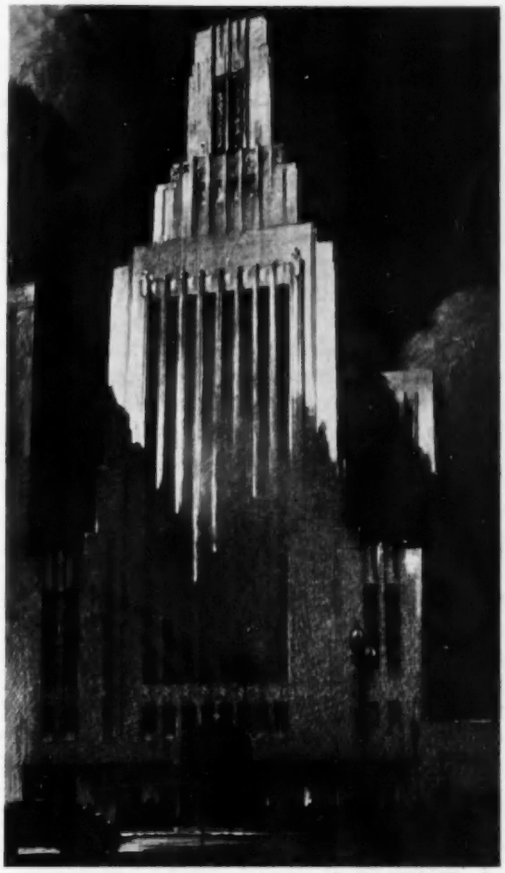
UNIV. OF MICH.

THE PROBLEMS OF THE SMALLER OFFICE BUILDING

BY

WILLIAM C. WAGNER

OF THE OFFICE OF MORGAN, WALLS & CLEMENTS, ARCHITECTS



Photos. Mott Studios

Proposed 13-Story Office Building. Morgan, Walls & Clements, Architects

THE driving force that determines the worth and extent of a commercial enterprise is the question of economic soundness. This is an elemental truth, since adherence to economic law is the foundation of all business. It is expedient, then, in investment building, to accord first consideration to economic problems.

The question of location bears an important relation to a building enterprise because it largely determines rentability and rental value. Rentability is indispensable to the success of a project; rental value fixes the maximum income, the production of which is the fundamental purpose of the building. The selection of a site is the first item of a financial set-up because it establishes the cost of the land, it determines that part of the operating and carrying charges assignable to land tax, and it imposes plan conditions.

Buildings of various types and sizes are confined in their range of location by the precepts of economics. Whether the cause or the result of high land value, it is true that buildings of skyscraper proportions are invariably built in districts where land value has increased to the point where great height is necessary to absorb the cost of the land. It is obvious that such districts are established business centers, and that therefore the element of risk attributable to location is reduced to a minimum, because the determining factors have been satisfactorily adjusted. Since this condition is not always present in sections where smaller office buildings are economically justifiable, the problems of location cannot be dismissed as solved for this type of building.

The plan controls the cost of the building and supplements the cost of the land in determining the operating and carrying charges. By the proportion and nature of its rentable area it influences rentability and governs potential income. Thus one is obliged to develop a plan that will yield the maximum rentable area, and the utmost efficiency for its intended use. Ease of revision and adaptability to mixed tenant requirements are notable advantages in investment buildings, because they expand the limits of occupancy. The questions of tenant accommodations, building service, elevators, and general circulation, and provisions for lighting, heating and ventilating, are elementary but most important problems.

Maximum rentable area means maximum earning power for the expenditure involved. But the fact that rentable area is a maximum is not full indication that the building will be an economic success, because the net income might not be of sufficient magnitude to be a profitable percentage of the capital investment. This percentage can be computed by a comparison of

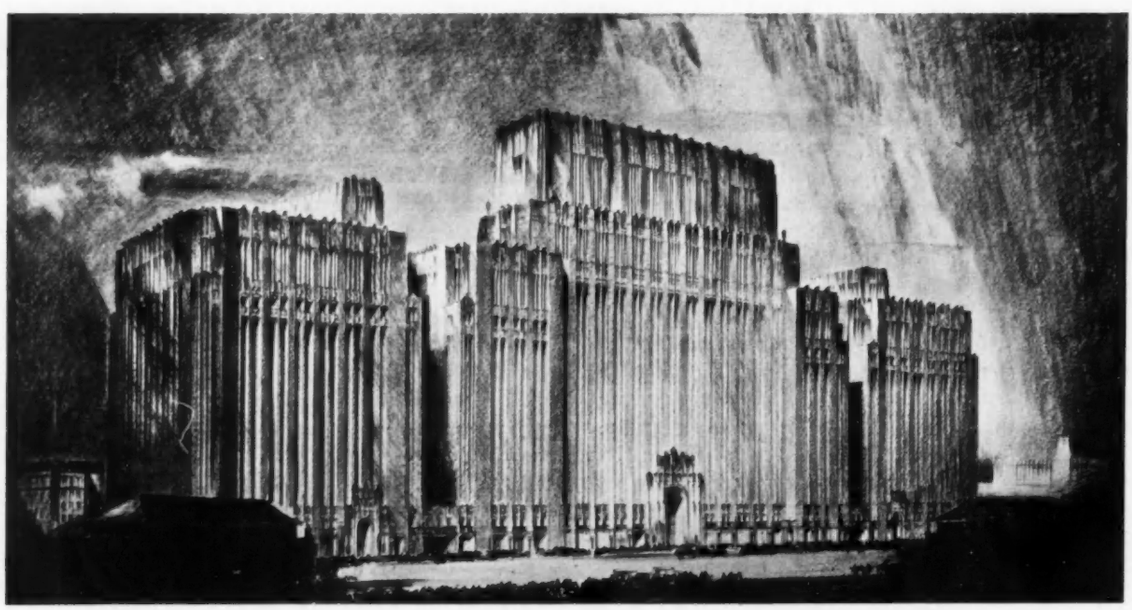
the net income, the capital investment, and the complete cost of the project. An analysis of these factors will show whether an increase or decrease in size will make the building more profitable.

A building to be occupied entirely by one organization presents a problem whose requirements are more specific than those of a building projected solely for investment purposes. The basic consideration is not primarily that of ultimate expenditure, but more a problem of providing adequate accommodations for the present and future needs of the organization to be housed. Thorough knowledge and understanding of the reciprocal relations of all departments and their individual operating requirements are essential in order to provide the most satisfactory departmental grouping. Skillful arrangement has great time and labor-saving potentialities—qualities that are primary requisites of all programs for reducing operating costs. The phase of the problem that presents the greatest difficulty and the greatest liability for miscalculation is the forecasting of future needs. Here there is required an exhaustive survey of the development of past years, combined with an intelligent analysis of all facts contributing to probable expansion.

There is often the tendency, in considering the probabilities of future expansion, to so arrange the plan as to facilitate further building operations. The matter of expansion presents a problem that deserves very careful study because of its hypothetical nature. Any provisions for expansion that limit the efficiency of the plan, or cause additional expense, are almost never advisable, because elaborate programs of expansion are very seldom executed. Horizontal expansion is limited by the confines of the site and by the permissible distances between correlated departments where intercommunication is of major importance. Wherever practicable horizontal expansion in the form of wings added to the original structure is more desirable than vertical expansion, because of its greater flexibility, its greater ease of execution, and the fact that it entails no additional original expenditure. Provisions for vertical expansion necessitate enlarged footings and foundations and increased strength of columns. The consequent additional expense, while not necessarily prohibitive, involves tying up an appreciable amount of capital in an unproductive investment.

The advisability of incorporating an automobile parking garage in the general scheme can best be determined by an accurate survey of the accommodations of the locality, the requirements of the building, and an analysis of the economic program. Experience has shown that in general an automobile parking garage in a small office building is not in itself an economic unit. A study of the required expenditures, the operating costs and the net income will show in a majority of cases that as a separate entity a parking garage is an accommodation only, and that it can be considered justifiable only for its effect on the ultimate success of the project.

The elevator has become the most important public service unit in office buildings, because by providing the necessary means of access to upper floors it has provided a source of income. Therefore, since elevator service is an index to rentability, an installation should provide the highest standard of service compatible with the



needs of the building. This is absolutely essential.

It is necessary first to consider the character of the building and the number and types of floors to be served,—whether basement, garage or office floors. The occupancy of the building is then estimated from the rentable area. Good circulation requires that the interval at which cars leave the entrance floor be from 20 to 30 seconds, and that the total number of occupants of a building be moved in not more than 45 minutes. It is then possible to accommodate in five minutes one-ninth of the number as a morning, noon or evening peak load, which is in accordance with good practice. Operating on an interval of from 20 to 30 seconds in a smaller office building generally increases the capacity for handling peak loads and reduces the time required to move the entire number of occupants. A study of the peak load, the passenger capacity of each cab, and the time required for a full round trip, will determine the number of cars required to provide satisfactory elevator service. A survey of operating devices and control systems is advisable to help facilitate and expedite a smooth flow of traffic.

The problem of elevator service in a building for a single purpose is more complicated and requires a more detailed study than in a building of general utility. Peak loads are generally greater, noon traffic will probably be equally heavy in both directions due to the existence of a cafeteria or recreational space in the building, and the intermediate traffic will be more brisk due to interfloor communication.

The factors that control the choice of a structural system are the limiting characteristics of the materials used. As building height increases and spans lengthen, use of reinforced concrete gradually becomes impractical due to proportional increases in the sectional areas of the structural members. Where the height of the building and the nature of the plan permit a choice between reinforced concrete and steel frame construction, and where the economic program will allow the increase in cost, it is desirable to employ a steel frame because of its greater adaptability and its greater ease of structural revision.

The smaller office building presents no problem in design that is not subject to the same principles of simplicity and directness that obtain for any type of building. It is conceded that design should proceed from structure, that it should be a rational expression of purpose. Depending upon the nature of the building, whether for general utility or for a special purpose, the problem becomes one of expressing desired qualities of the structure, or of isolating distinguishing characteristics of an organization, and expressing these architecturally. This is a difficult problem that demands ingenuity and imagination,—a problem where style is not necessarily pertinent.

Nevertheless, where a building has been developed with an intelligent use of materials, with a thorough understanding and sympathy for all the principles of modern business, where there has been a successful endeavor to provide conditions wherein these objectives can be fully maintained and developed, how can the design do otherwise than reflect frankness and thorough efficiency, straightforward simplicity and refinement, an inspiring sense of fitness and an honesty of purpose? And are not these fundamental requirements of successful business?

On Opposite Page, Three Office Buildings Connected by Garage Entrances. Morgan, Walls & Clements, Architects

(Right) Store and Office Building for the Dominguez Wilshire Company, Los Angeles. Morgan, Walls & Clements, Architects

Private Office: Todd, Robertson & Todd Engineering Corporation, New York
Sloan & Robertson, Architects

A Large General Office: Brooklyn Edison Co., Inc.
Voorhees, Gmelin & Walker, Architects

THE INTERIOR ARCHITECTURE OF OFFICES

BY

ARTHUR LOOMIS HARMON

THERE is much talk of the romance of business. Is it reflected in the architecture of the offices where it is conducted? Start with a large general office as shown in the illustration. This is part of one floor of which there are many in the building, duplicated in many others but with less light and less of order. Fill it with people, and in them there is romance; but then you must include their hours outside the office, the range of their thoughts while there, and the office clock. Of architecture there is none in the usual sense.

Look into the executive offices. The lives of those who occupy them are more a part of the businesses. That is one of the reasons for their being in them. The returns are greater; something is left over in money and thought not only to impress the customer but also to satisfy the longing for a beautiful setting. If "rich" is more often the suitable word to define the result, the intention is honorable.

In looking for romance, remember that these spaces "have arrived;" prosperity and the conservative outlook are theirs. There is something to be said for the wife in Barrie's "Twelve Pound Look" who was tired of her husband's "fat friends" eating his "fat dinners." You see some of it. Perhaps the reason there is not more is the fault of the designers. Or it may be not in themselves but in the stars; at least in their orbits, for these days stars are known by the orbits that they keep, and in the orbits which run through business offices the romance may have been paid in somewhere else, to appear again on the books of the company,—of course in profits.

There are physical limitations which go with the office interiors. Ceiling heights are not bad, but are uniform and not high. Windows are large and few in number. Grouped windows are extremely rare. One or two walls may be blank and unbroken. Something is wanted to give a

Sigurd Fischer

A Telephone Room, General Motors Building, New York
Shreve & Lamb, Architects

Sigurd Fischer

(Left) Board Room, Brooklyn Edison Co., Voorhees, Gmelin & Walker, Architects

(Page Opposite) The Information Desk at Brooklyn Edison Co., Voorhees, Gmelin & Walker, Architects

feature on one of the walls. It is for this reason in most cases, I think, that fireplaces are introduced,—for their architectural value rather than in the expectation of their use.

Individuality is generally suppressed even in the private offices of executives. Sometimes one makes his office look like a living room as is shown in one of these illustrations. Even then he is careful not to carry this too far, and he strives to produce the effect of a room associated with the business rather than a living room in which he does his work. He would have no time for books. The pictures he might prefer would suggest an alien thought, at least to others, and so would the feminine influences that go to make his home, and if he used all these things he would be exposing himself to every stranger who came to see him on business.

The reader will note a tendency toward modernity. The reason is significant,—at least to me. Rooms seem to have distinct characteristics apart from their furniture. The characteristics of an office seem to me to lie in simplicity, dignity, a certain expression of use, and a suggestion of the thing behind the office which that represents. This, in most cases, is more fittingly presented impersonally than as the habitat of a marked individuality which is in itself the business.

The rooms where architectural treatment is demanded are usually of two kinds,—the execu-

Sigurd Fischer

tive office and the board room. In the larger lay-outs lobbies and reception rooms also become important and occasionally, libraries, and infrequently dining rooms. Examples of typical lay-outs of executive office floors are developed showing elevator lobbies, reception rooms, board rooms, private offices, and other spaces. Except in large concerns, however, opportunities for architectural effects in planning are rare.

The illustrations show some of the modern tendencies. In tall office buildings of large cities all material, except furniture, must be fireproof. This does not preclude the use of wood, since that may be rendered fireproof by chemical process. Floors are wood or composition, usually with rugs. Walls are treated in wood, plaster or composition; in any case simply, and in the case of wood frequently with flush unpaneled surfaces. Ceilings are most often plaster. Lighting is still the problem, here as elsewhere. Direct lighting is hard to dispense with at a desk. For indirect cove lighting there is seldom space. Indirect lighting from the ceiling is good for general illumination, but most people seem to dislike a bright ceiling and dark floor, preferring direct light from chandeliers or brackets for decorative as well as lighting values. No doubt in this article it would have been better to take the architecture and let the speculation go. However, that is what the illustrations are for!

Thomas Rotan

(Left) An Executive Office in the News Building, New York. John M. Howells, Raymond M. Hood, Associated, Architects

Mortimer Offner

An Executive Office for Ford, Bacon & Davis, New York. Eugene Schoen, Inc., Designers

MODERNIZING OLD OFFICE BUILDINGS

BY
GRAHAM ALDIS, Aldis & Company, Chicago
AND
F. P. BURT, Editor, *Buildings and Building Management*

THERE is a case in the courts today where a 198-year lease makes no provision for a building to replace the existing structure save in case of destruction by fire or other casualty. Lessor and lessee are now at issue on the lessee's right to replace the structure,—the Chicago Auditorium. The nineteenth century mentality which created such leases envisaged a commercial structure of the monumental type as a permanent improvement of as fixed a character as the Bank of England or a Gothic cathedral. Then the pendulum of thought swung to the opposite extreme. A number of early skyscrapers, the marvels of their day, from 10 to 15 stories high, succumbed within a couple of decades from the dates of their construction.*

CAUSES OF OBSOLESCENCE. It began to look as though the life of the typical office building might not much exceed that of battleships. These premature demises were due to: (a) inappropriate type of improvement, e.g., an office building in an intensive shopping district; (b) inefficient designs,—high ceilings, clumsily shaped offices, heavy masonry walls and (c) heights inadequate to earn a return on increasing land values.

STABILIZATION. Now, however, a better understanding and definition of urban trends increase the chances of constructing the right building. Office building design conforms to office users' requirements. Zoning and height limitation ordinances, whose general terms are stabilized in the greater American cities, insure that "maximum developments" will not be materially exceeded. If, then, we ignore two radical and reciprocally opposed suggestions,—first, artificial light and ventilation obviating the need of windows and light courts, and, second, all-glass exteriors,—ignoring these, we can assume that existing office building design will never be radically altered. If then, existing structures are going to stand for 40 years instead of 20, a very different economic philosophy will prevail about their upkeep. It will not be a question of patching the original mechanical installation to force its mechanical life to last out the economic life of the shell. Assuming the life of machinery to be from 10 to 20 years,* one and perhaps two complete replacements will be normal.

DESIGN CHANGES. But utility, direct economy, is not the sole factor. If the disciples of the modern school are correct, it will, indeed, be the lesser factor. For, if design is henceforth to express purpose instead of accepted ideas of ornament, then much that has been acceptable, even impressive, is out of date. Today, in Chicago, the various "towers" built since the passing of the zoning ordinance of 1921 divide markedly into "before" and "after." Contrast 333 North Michigan Avenue and the Palmolive Building with the *Tribune* Tower, or with even the same architects' Methodist Temple, or with the Pure Oil Building. Not that the exterior appearance of these towers will be changed, but there is a mass of detail,—exterior and interior, cornices, trim, the corridor finish, the lobby, in fact the exterior of the entire lower floors,—where radical changes are not merely possible but indeed are highly probable in many buildings of 20-odd years' age.

It is not the province of this paper to discuss when a building is obsolete, but it should not be forgotten that there are certain cases where modernization is demanded even when strictly economic considerations would indicate a complete replacement. Such cases occur when a property is small or is being maintained for consolidation after the expiration of an adjoining lease, and more especially when the land tenure

*Champlain Building, 15 stories, northwest corner Madison and State Streets, Chicago. Erected 1894, demolished 1915,—21 years.

Trude Building, 14 stories, southwest corner Wabash Avenue and Randolph Street, Chicago. Erected 1897, demolished 1912,—15 years.

Manhattan Trust (Gillender) Building, northwest corner Nassau and Wall Streets, New York. Erected 1894. Typical fireproof, steel construction of the period, it became obsolete with respect to requirements of location and was torn down and replaced by a new building in 1912. Life, 18 years.

("The Effect of Obsolescence on the Useful and Profitable Life of Office Buildings," by Earle Shultz, p. 215. Published by the National Association of Building Owners and Managers, Chicago, 1922.)

*The life, in years, of some items of building equipment has been estimated thus:

Boilers—(a) Water Tube	24.5
(b) Horizontal Tube	16.1
Stokers or Grates	7.2
Boiler Plant Piping—(a) Steel	18.6
(b) Iron	30.0
Pumps	10.-16.0
Elevator Motors (Direct or Geared)	16.4
Signal and Control Equipment	5.8
Elevator Cabs	30.0
Safety Equipment	5.3
House Water Tanks—(a) Steel	23.5
(b) Wood	13.6
Water Closet Bowls	21.3
Water Closet Flush Tanks or Valves	9.8
Water Closet Seats	11.0
Radiators	27.5
Indirect Radiation	21.2
Electric Fixtures	9-12.0

("Depreciation of Office Buildings: Its Relation to Income Tax." Published by the National Association of Building Owners and Managers, Chicago, 1925.)

is qualified, e.g., subject to easement or possible condemnation; or, where the terms of ownership or of the 99-year lease do not permit rebuilding, or contain revaluation or other provisions which prevent financing a new building. Such cases are exceptional, but are probably numerous.

THE PURPOSE OF MODERNIZATION, in fact of any building alterations, is of course to enable the building so altered to compete profitably with other newer or better buildings. The factors usually included in modernization projects are: (1) operating efficiency, (2) appearance, and (3) "rentability," the factors other than æsthetic which appeal to tenants. Ordinarily, the requirements of such a project are not confined to one of these factors but may include two or even all three of them. In this discussion the engine room proper may be disregarded. Changes of equipment in this department are made as they would be in a power plant, primarily for operating efficiency, although rentability may also be improved.

CONDITIONS FOR SUCCESS. It may be observed that most of the buildings that undergo successful rehabilitation are those that have gained good repute in early life and which also possess certain inherent advantages in location, etc. An example of this type of structure is the Marquette Building, in Chicago, completed in 1895 and "still going strong." This building was fortunate in its,—for the time,—advanced design, with impressive lobby, shallow and well lighted offices, and modern surface materials, such as terra cotta exterior, mosaic tile flooring, mahogany and marble trim. The lighting fixtures have been replaced at least three times, and the electric wiring once, during this period of time. The elevators are now of the high-speed variable voltage electric type. Thus, this 16-story, 36-year old structure continues to capitalize profitably both its own history and the history of Pere Marquette as perpetuated by its uniquely developed and decorated lobby.

ELEVATORS. Hydraulic elevators are almost everywhere being supplanted by electric elevators if for no other reason than economy of operation and the wearing out of the cylinders. The instances where old rheostat-controlled electric elevators are being supplanted are becoming more and more frequent, wherein there is some gain in operating efficiency. But the primary motive for the change is a refinement in the service rendered to the tenant. He feels that he is enjoying the newest and the best. More marked even, because of this motive, is the replacement of elevator cabs as the enclosed shaft requires an enclosed cab. Nevertheless, even where the shaft is not enclosed,—even in some cases where it enjoys natural daylight,—enclosed cabs have been installed so that the passenger will enjoy the feeling of being boxed up and expressed skywards in the manner characteristic of the newest buildings. The manager of an old building cannot afford to ignore "sympathetic magic."

THE DREXEL BUILDING, in Philadelphia, has entered its 42nd year of successful operation. Its record of space occupancy normally runs between 92 and 96 per cent. It is one of the earliest buildings of modern type, with fireproofed metal columns, girders and beams. It began life with this sturdy framework, with good proportions, and has had the advantage of fostering care. Its owner, the late Anthony J. Drexel, made special provisions in his will for the welfare of the building, stating his purpose thus: "My object in this is that I would wish my descendants and members of my family to be interested in the Drexel Building, and especially because I believe that there is no more certain or reliable property to be held than real estate." Rejuvenating operations on this building have been quite frequent. Major structural changes included the entire remodeling of one of the street entrances, eliminating entrance steps, widening the entrance doorway, and providing a street-level vestibule; the construction of two new floors on a level with the second and third floors of the remainder of the building, in a large, tall section that formerly contained the banking quarters of Drexel & Co.; the opening up of a light court on Chestnut Street by removing a narrow four-story building whose owner would not sell at the time the Drexel Building was erected,—this last change releasing good space for a row of well lighted offices on the second, third and fourth floors.

Other improvements included a complete reconstruction and re-equipping of the toilet rooms; a thorough modernizing of the lighting system in the offices as well as the public spaces; the covering of all office floors with linoleum; the enclosing of the elevator hatchways with steel framed wire glass, and the installation of double swinging steel doors in the entrances to the corridors, also glazed with wire glass. Two additional passenger elevators and one freight elevator have been installed, but the hydraulic system of operation has been retained. Except for the installing of duplicate generating apparatus, there has been no radical change in the mechanical plants. The notable thing about the keeping up of this building is that it has been a continuous process, based upon a fixed policy to keep close watch for opportunities to make improvements and to see that they are made before tenants complain or even suggest changes.

STORE FRONTS. A few years ago the general tendency was toward making store fronts with the maximum glass area and no visible means of supporting the superimposed walls. This require-

ment by merchants was a natural cause of grief to many architects and an obvious source of difficulty in reconstructing old buildings having solid masonry piers or bases.

About the most extensive and costly of cases on record is that of the First National Bank Building, in Chicago, an office building, the high repute of which has kept it well filled with tenants at high rental rates since its opening in 1902. Continuous operation was provided for the bank and the tenants during reconstruction. (For more complete data see THE ARCHITECTURAL FORUM, February, 1930, page 289).

THE CHEAPEST CASE of modernizing found, one that, nevertheless, was exceptionally profitable, is that of the Sonna Building. This is a three-story brick building that stands on one of the most prominent corners in Boise, Idaho. It was built in three sections between 1886 and 1896 and occupies a main street frontage of 223 feet and a depth on a side street of 122 feet. After being the principal building of the city for an average building's lifetime, it was forced to compete with several new fireproof office buildings. Being owned by an estate whose trustees were not willing to wreck and rebuild, it was put through a renovating process that consisted chiefly of remodeling the entrance and lobby, resurfacing corridors and repainting walls and trim in the office space and improving store fronts and incidentally getting rid of objectionable signs. The cost amounted to about $13,000. Tenants have been retained, have been charged higher rents, and the net resulting increase in revenue is sufficient to pay off the investment for reconstruction within two and one half years.

ADDITIONS. Remodeling old buildings is frequently brought to the attention of owners when they construct additions to their existing buildings. In such instances the progress made in construction methods and the development of equipment accentuate the shortcomings of the old structures. Building owners and managers are interested in obtaining the maximum rental income, and to this end it is frequently necessary to spend some money on an old building in order to prevent this space from depreciating the rental value of office space in the new section.

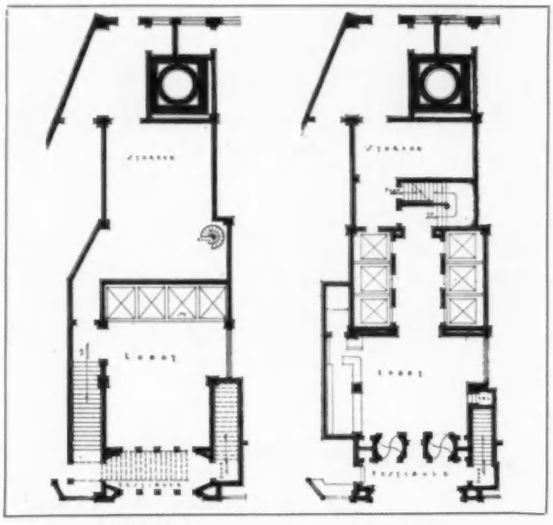
The importance of making these decisions correctly has resulted in the Building Planning Service being called upon to work on a number of assignments where additions to existing buildings were involved, such as the Huntington National Bank Building, Columbus, Ohio; the Paulsen Building, Spokane; the Yeates Medical Building, Minneapolis; and in two other instances, the First National Bank Building, St. Paul, and the Penobscot Building, Detroit, the new additions were so much larger than the existing buildings that the new structures could hardly be called additions. In the Huntington National Bank Building it seemed desirable to make some changes in the corridors of the old building.

Original Store Fronts

Remodeled Store Fronts
The Arcade Building, Cleveland

CORRIDORS. In general, the trend in corridor treatment in new buildings is to the use of full glass panel doors, whereas in the older buildings the half glass panel door was standard. With the development of the full glass panel door, borrowed light in corridors became less essential; and as borrowed light installations are more expensive than a straight plaster wall finish, new construction is less expensive than the old type.

LIGHTING. More progress has undoubtedly been made in developing efficient lighting units than in other office building furnishing. The tendency has been toward using a semi-indirect type of enclosing fixture and a larger sized light bulb, for the double purpose of providing additional light for tenants on the working plane, and to obtain a more uniform distribution of light. In some instances to the additional current requirements for lighting was added the current required for operating time and labor-saving office appliances, such as adding machines, electric typewriters, etc. Older buildings have not been wired with a sufficient amount of feeder copper to carry the required current. In one instance



Original Plan Alteration Plan

Old and New Arrangements of Main Entrance, Lobby and Elevators, Rose Building, Cleveland

this has necessitated the installation of larger feeder bars to the distribution panels on various floors, which entailed a considerable expenditure of money. The trend in office building electric consumption is toward even larger uses of current, and a number of old buildings may be faced with the necessity of furnishing additional copper within the next few years.

INTENSIVE SPACE USE. An additional problem is presented in the more intensive use of office building space, and whereas 110 square feet was formerly considered the average space required per capita, the more efficient tenant layouts have decreased space requirements so that some modern buildings have been planned for normal occupancy of 90 square feet per capita. In certain instances, where office space is used as open workroom units without partitions, the actual rate is one worker for each 65 square feet of space. These trends not only indicate the need for faster elevators but in some instances may involve adding additional elevator units. One example is that of a LaSalle Street building in Chicago where an additional elevator was installed some three years after the building was opened. The additional elevator unit cost more than double what it would have cost if it had been installed when the building was originally constructed. Such changes can be anticipated.

HEATING. Recent developments in heating plants for office buildings have been toward the use of temperature control devices which require new appliances attached to the equipment rather than changes in the basic heating system. The old type of multi-tubular radiators, with the top and bottom headers, has been replaced by shallower two- or three-column cast iron radiators. Within the next few years we may see a wider use of light weight copper radiators with extended surfaces, which will greatly reduce the floor area that they occupy.

STORE FRONTS. Probably a greater amount of money has been spent in downtown commercial buildings for the rehabilitation of store fronts than in any other portion of the buildings. The old structure is frequently handicapped by having a large amount of stone or other facing material, which reduces the amount of available window display space. Even banks are desirous of obtaining additional window display space, and the Northern Trust Company of Chicago has expended a considerable amount of money to obtain additional ground floor window area.

ADDING STORIES. Another item to be considered in this general subject is the addition of stories to a building after it is completed. While this is usually space expensive to produce, it has been secured in the Garland, Peoples' Trust, Northern Trust, and Bell Telephone Company (Washington Street) Buildings, in Chicago.

A DANGER. We often are a wasteful people, particularly in prosperous times. Often it requires an economic shock, like that administered last fall, to make us conscious that we are running toward disaster, notwithstanding cautionary signals such as had begun to appear a year or more ago. Even now there are some in the building construction field who appear to think that what is known as President Hoover's plan to restore confidence means that these warnings may be disregarded. But we can assume that the President and his advisers are astute enough to realize that the operating of commercial buildings is an industry comparable with any other large industry,— railroading for example. With our office buildings abnormally vacant, there is no more justification for erecting new structures to remain empty, to increase vacancies in and further jeopardize the income of real estate bondholders, than there is to encourage the paralleling of already adequate railway lines or the purchase of new rolling stock when yards are full of idle cars. The campaign now being carried on from Washington by the Department of Commerce may, however, logically have support from those who have the older buildings in their charge.

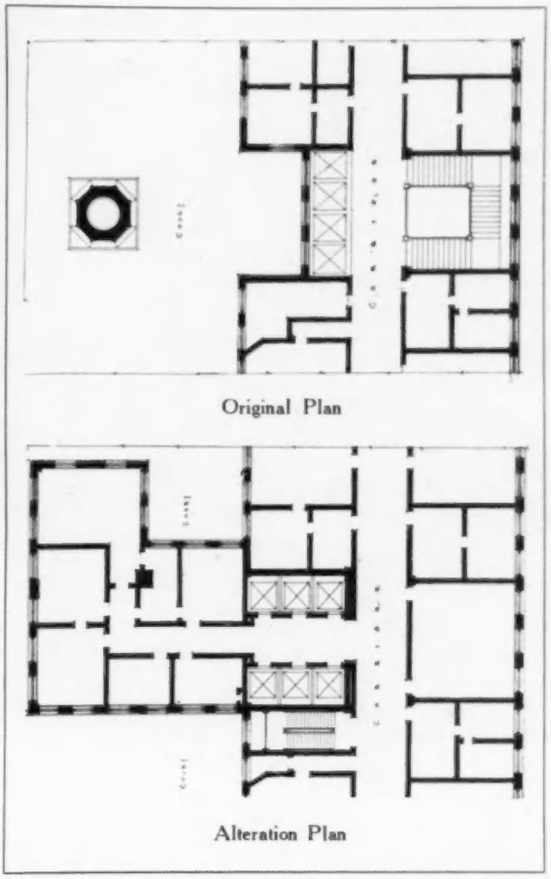
CONDITIONS JUSTIFYING MODERNIZING. A good name, advantageous location and enough height to constitute a reasonably adequate improvement of the site from an earning standpoint are important factors in justifying remodeling. To these should be added a floor plan having dimensions that permit the laying out of office units to meet the local demand. The word "local" is used because it is a fact that preferences in office dimensions vary considerably with the

Remodeled Entrance and Elevator Lobby, Rose Building, Cleveland

locality. In the northern tier of states, from the Mississippi to the Atlantic, a bay width of from 16 to 18 feet and a depth from windows to corridor of from 22 to 26 feet are generally acceptable. But in some parts of the country offices so dimensioned would not find a ready market, nor would tenants accept the low ceilings that have come into vogue in cities where building height regulations create an urge to crowd in an extra story. Indeed, some of the older buildings are beginning to learn that their high ceilings, airiness and spacious lobbies, while expensive to maintain, are not such bad investments after all.

The author recently took a group of persons on a detailed inspection tour of two prominent buildings in a good sized city. One was of the type described. The other was an excellent example of the intelligently but very tightly planned modern type, as efficient an operating unit as an ocean liner. The respective managers were equally characteristic. The older man had grown up with his building, knew every tenant's idiosyncrasies and indeed had sometimes provided for their requirements before the tenants themselves had realized them. His competitors were brisk, exact and accurate, and demonstrated their automatic water coolers and gadgets as enthusiastically as automobile salesmen. The inspecting group divided about equally in their preferences as hypothetical tenants from out of town.

But, given these attributes of good reputation, strategic location, appropriate height and floor dimensions, the remodeling of a sound, fireproof framed structure is a sounder conservation of established values than perhaps promoters realize. And this is true even if it proves necessary to



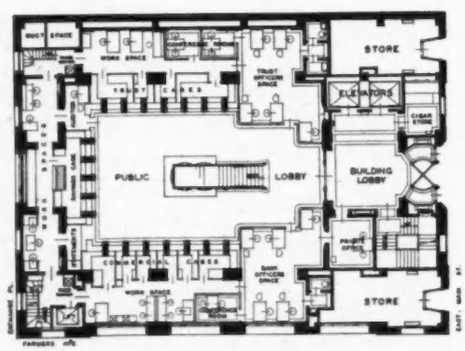
Original and Alteration Plans Showing Addition in Rear. Rose Building, Cleveland

re-face the exterior, redecorate the lobby and corridors, and supplement and modernize the elevator, heating, lighting and plumbing plants.

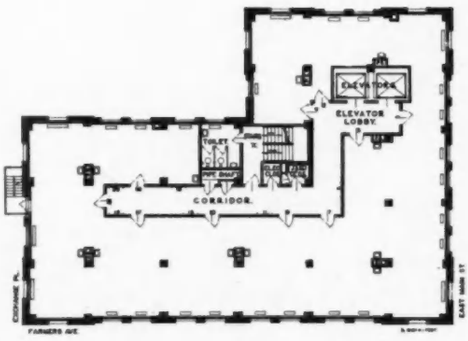
The skyscraper has been hailed as one of the most characteristic expressions of the American genius. Yet, paradoxically, it is one of the least "rationalized." The 2000-odd buildings have nearly as many owners. Many of these owners, like banks, public utilities and large corporations, regard their buildings as a subsidiary matter. Other buildings suffer because of absentee ownership, ownership by estates, etc., willing to sell space but lacking the knowledge of how to improve. Gradually, however, the owner is coming closer to the management and is realizing that his office building is a business and not a fixed investment. Through a systematic study of the rental market, investors and promoters are acquiring a belated recognition that the law of supply and demand applies even to office buildings. With this stabilizing influence, alert owners of sound old properties can be expected to institute rehabilitation programs with increasing frequency and of greater comprehensiveness.

GENERAL VIEW

NIGHT VIEW



FIRST FLOOR



A TYPICAL FLOOR

KALAMAZOO TRUST & SAVINGS BANK BUILDING.
WEARY & ALFORD COMPANY, ARCHITECTS

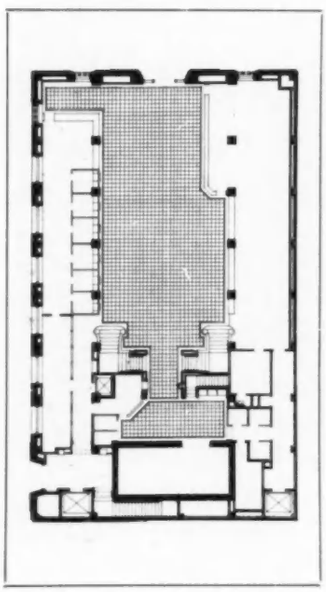
Oscar V. Hunt
PROTECTIVE LIFE INSURANCE BUILDING
BIRMINGHAM, ALA.

Oscar V. Hunt
WATTS BUILDING
BIRMINGHAM, ALA.

Tebbs & Knell, Inc.
ALABAMA POWER CO. BUILDING
BIRMINGHAM, ALA.

Overbey Studios
MERCHANTS NATIONAL BANK BUILDING
MOBILE, ALA.

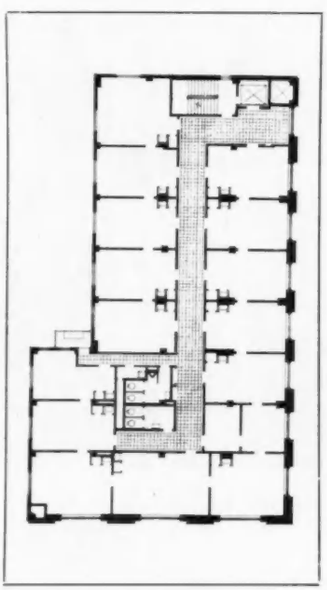
FOUR OFFICE BUILDINGS DESIGNED BY
WARREN, KNIGHT & DAVIS, ARCHITECTS

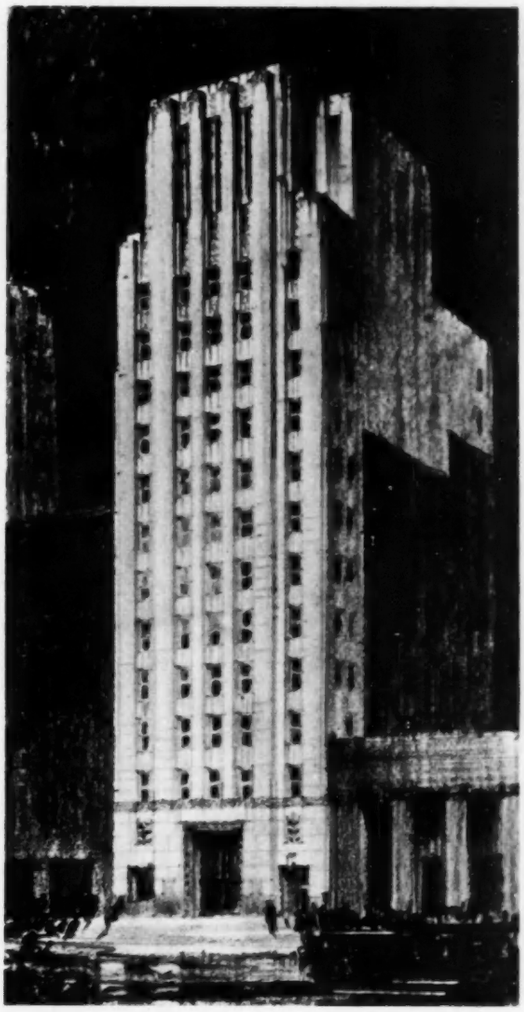


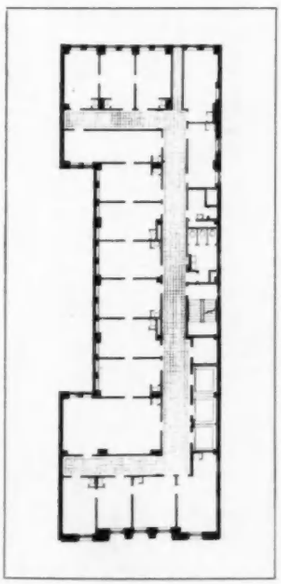
FIRST NATIONAL BANK
BUILDING,
BEVERLY HILLS, CAL.
DESIGNED BY
JOHN PARKINSON AND
DONALD B. PARKINSON
Architects

(LEFT) FIRST FLOOR

(RIGHT) TYPICAL FLOOR







TWO OFFICE BUILDINGS
DESIGNED BY
JOHN PARKINSON AND
DONALD B. PARKINSON
Architects

(LEFT) THE BUILDING FOR HARRY J. BAUER, LOS ANGELES, CALIFORNIA

(RIGHT) THE BUILDING FOR BANK-HUNTLEY & COMPANY, LOS ANGELES, CALIFORNIA

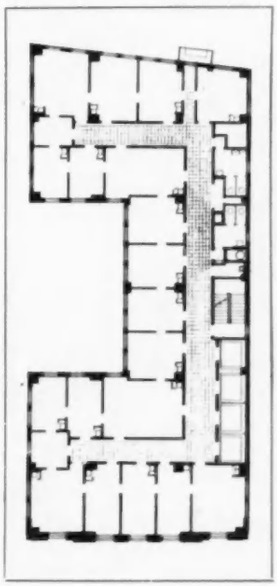
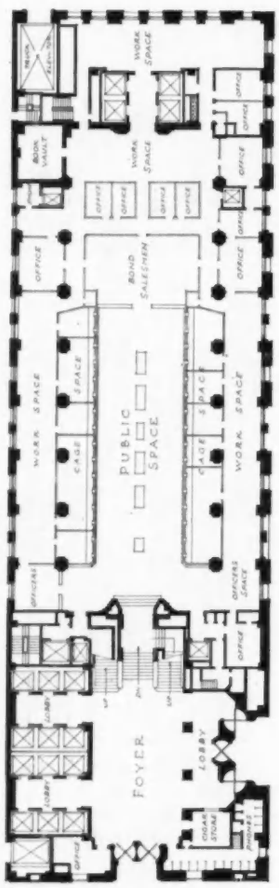


Photo. Thomas Ellison

UNION TRUST CO. BUILDING, DETROIT. SMITH, HINCHMAN & GRYLLS, ARCHITECTS



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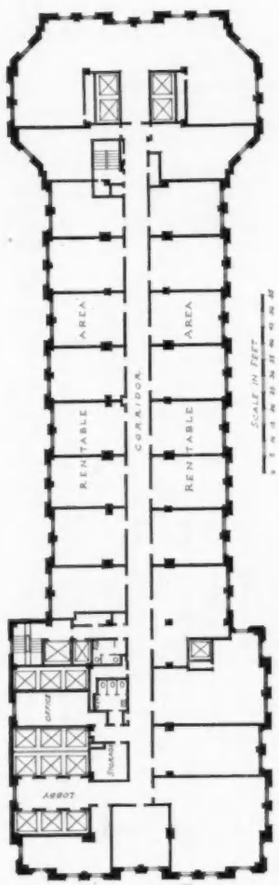
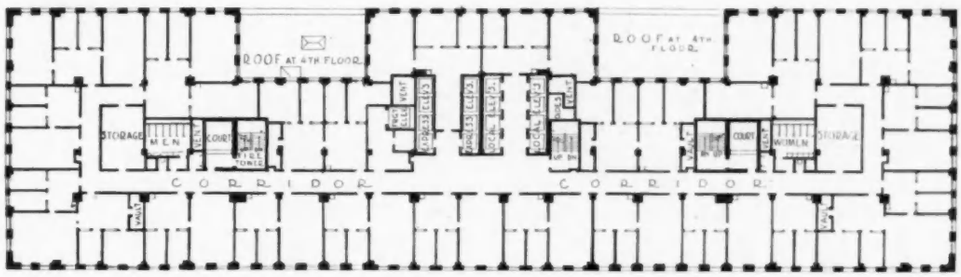
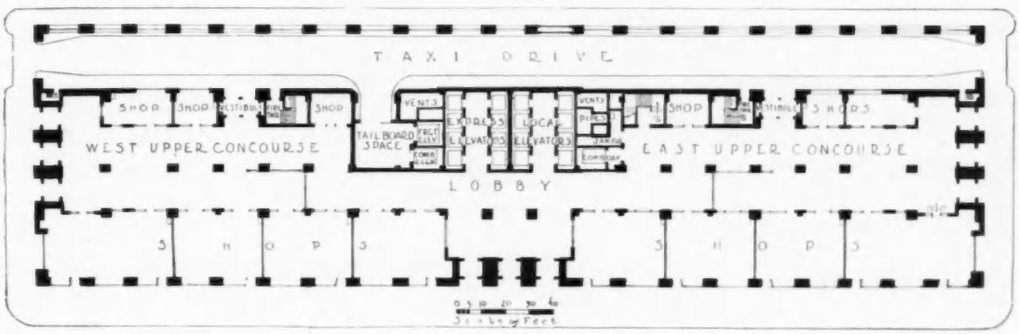


A TYPICAL FLOOR

BROAD STREET STATION BUILDING, PHILADELPHIA.
GRAHAM, ANDERSON, PROBST & WHITE, ARCHITECTS



A TYPICAL FLOOR



FIRST FLOOR

(*Continued from page 786*)

seem to be a most impracticable and time-destroying basis of hoisting passengers. On the other hand, the amount of space taken up by elevators can easily kill off legitimate profits in an office building so some way will just have to be found to solve the problem.

Uptown, around the Forty-second Street district, we have lots of new gimcracks in the way of office buildings. A very good one is 10 East Fortieth Street, a forty-story effort by Ludlow and Peabody; another is at the corner of Forty-third Street and Fifth Avenue, by Shreve, Lamb and Harmon, who by-the-way, enjoy the distinction of putting up two monsters at the same time on the two most important corners of Fifth Avenue. The newer Salmon (nothing to do with smoked or canned) at Forty-second Street and the already famous Empire State Building replacing the old Waldorf at Thirty-fourth Street ought to make those genial young architects extremely taken with themselves.

It seems that Shreve and Lamb delved a little bit in the old family library one day and got out some of those well-known and widely-used ram's heads. They clapped them on their 43rd Street masterpiece over the windows, as usual.

We happened to be passing that corner one day, the other star-gazer being Harry Allan Jacobs, an architect of personality, charm and sentiment.

"Questionable taste, those ram's heads," said H. A., "they shouldn't advertise the designer like that."

"How so, buddy?"

"Why, ram's heads, *rams!* Wasn't the architect named Ram?"

"No, no, stupid, *Lamb*, not *Ram*."

"Whasser difference?"

"Whatye mean, whasser difference?"

"All the same, friend, all the same. Practically no difference—a ram is just a lamb with ambition.

The Daily News Building on 42nd Street is a new vertically-striped bedticking-like affair of Raymond Hood and J. M. Howells, just a block away from that epic of publicity the Chrysler Building, she of the needle-pointed top, the automotive decoration, the windows out on the edge of the brickwork and the vast gleaming and shimmering dome up in the clouds—probably the nearest that the shimmy will ever get to Heaven!

To our untutored mind, the entrance lobby of Mr. Chrysler's monumental mist-piercer is the most stunning thing in town. *The* most gorgeous marble ever seen in an office building since the Metropolitan Life lined its two-storied lobby with a coating of gorgeous Gorgonzola cheese—or was it Pavanazzo? It didn't have the smell but it sure had the look.

One day, Mr. Whitney Warren took a 3B Koh-i-noor in his left hand (being a little gouty in the right) and dashed off the New York Central Building, squatting like a great granite *grenouille* across Park Avenue and gorging and disgorging taxicabs through two openings which were too small the very first day they were opened. The dome of this building at night, however, is one of the sights of the city and vies with Palisades Park across the Hudson in the number of electric lamps used.

The Lincoln Building is another flash-back to old lines. This time Pugin's Gothic was the most popular tome in the library and the top of the tower reveals three great Gothic openings serving what? A music hall or a theater perhaps, just to out-Chanin the Chanins, who really have got a theater in their own building.

Yes, there is nothing the matter with our office buildings. Some have a shape that would never get them a job at Paquin's, others have a few warts and excrescences sticking out of them in the most indelicate places; some are overloaded with ornament, others are stripped for action; a few just end off short, with not even a tank showing, others have a neat roof such as should cover a nice farm house; one we know has a lot of gold spikes sticking up on top, another has a Greek temple on high. But all in all, by and large, they all get by and perhaps we shouldn't expect perfection in this decadent age.

THE ARCHITECTURAL FORUM

VOL LII, No. VI — JUNE, 1930

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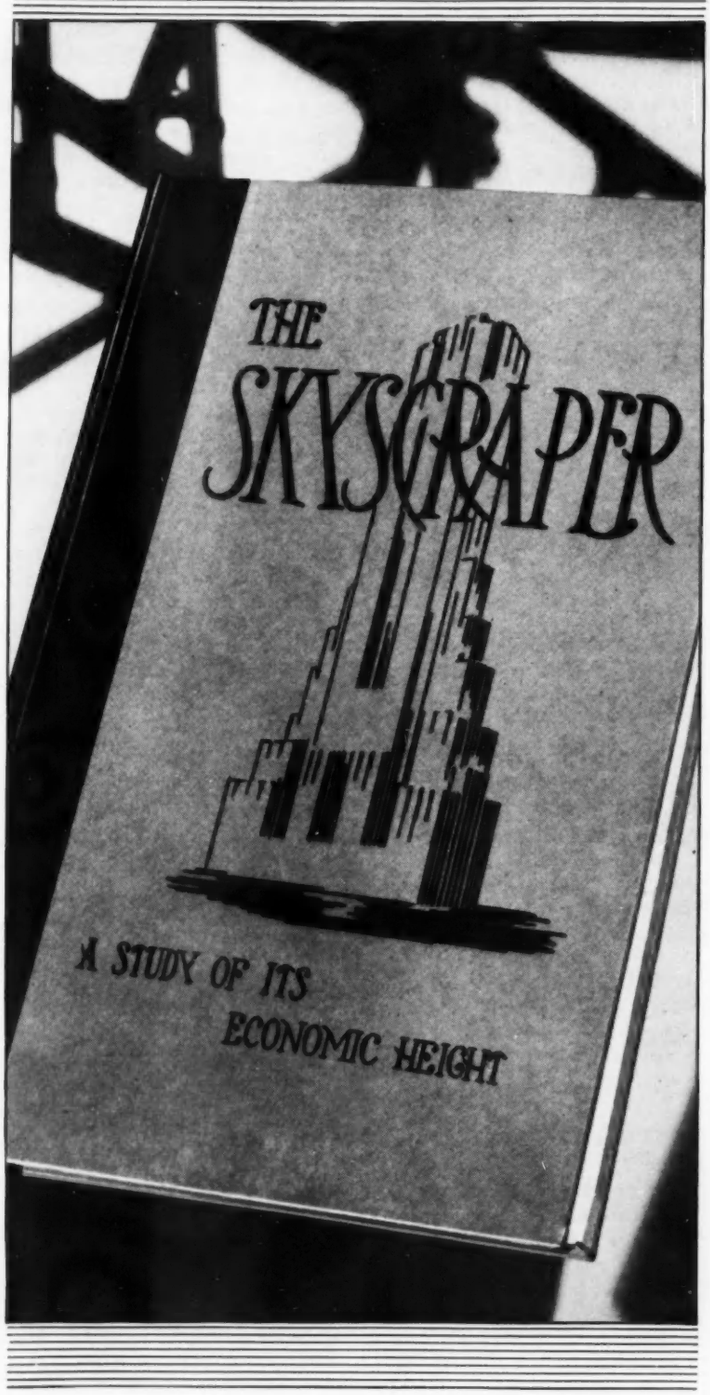

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THE NEWS BUILDING AND THE CHRYSLER BUILDING, NEW YORK, NEARING COMPLETION

UNIV. OF MICH.

THE
ARCHITECTURAL
FORUM

VOLUME LII NUMBER SIX

JUNE 1930

THE SKYSCRAPER OFFICE BUILDING

BY
PAUL ROBERTSON
PRESIDENT, THE NATIONAL ASSOCIATION OF BUILDING OWNERS AND MANAGERS

THE skyscraper is distinctly American. Its design and development have been largely the work of American architects. The successful operating of huge buildings is an American enterprise. The success of the skyscraper is due to the fact that it fits admirably into the scheme of American life and business. When properly designed, it is the most efficient type of business building that can be provided and it contributes greatly to the efficiency of business generally. This is accomplished by providing quarters which are conducive to better work and also in providing a great number of neighbors in the same and adjoining buildings with whom business may be speedily transacted.

America's history has been one of great industrial and commercial growth and expansion. The growth of the business of the nation could have been traced throughout the years, even though all other factors were unknown, by the evolution of the business districts of American cities. The advent of machine methods of manufacturing brought about the business man who needed office space from which he could direct the distribution of the increased volume of production. As manufacturing developed and commerce increased, the need for office space grew. Instead of spreading out all over the cities, he recognized the value of centralizing business activities, and this was made possible by making buildings higher. In this day of really big business, it is only natural that we find the mammoth buildings of the present.

The development of the tall office building has been seriously handicapped by the low height limitations imposed by the same type of mind that looked with holy horror upon the advent of the railroad with its paralyzing speed of 15 or 20 miles an hour. In Chicago, for example, the height of buildings has been jockeyed up and down no less than six times, causing an uneven development throughout the business district. The owner who built during the low-limit years found himself facing severe competition from the owner who was able to make a greater use of his site when the limit was raised.

The skyscraper is the result of the operation of economic laws rather than due to the fancy of architects or the whim of property owners to see buildings soar to higher levels. Its development has not been contrary to public policy but rather has been a great contribution to the upbuilding of the commercial structure of the nation. Were there no zoning laws compelling set-backs, even better plans providing for adequate light and air would be carried out. The set-backs would probably be there just the same, but extended to lower floors. Many of the zoning laws defeat their very purpose by forcing the construction of deep, dark and poorly ventilated space in the main base of the building. Methods of construction giving adequate light and air provide office space of a type that is suitable for and acceptable to business men. The building owner is as vitally concerned with light and air as any zoning protagonist. He utilizes the facilities at his disposal in providing adequate illumination, both natural and artificial, for his building. He knows the part that good ventilation, which means good air, plays in the success of his building as a commercial enterprise.

The old hue and cry that the skyscraper is responsible for traffic congestion has been growing weaker and weaker as traffic authorities have thrown light upon the question. One need only cite the congestion of London streets, where there are no skyscrapers, but with a business district spread "all over the map" to show the fallacy of the argument that the skyscraper causes congestion. Boston, a low building level city, has as great a traffic problem as New York or Chicago, where the tallest structures are three and four times the height of Boston buildings.

Meanwhile, economic laws continue to operate and they have brought about the day of the taller building and the larger building. The trend toward buildings of greater height and cubage has been impressed upon office building owners and managers through both the rental surveys and the Building Planning Service of the National Association of Building Owners and Managers. In 1924, the rental survey showed that the average office building had 61,473 square feet of rental area. The survey of January 1, 1930, disclosed the fact that the average office building in the United States had 83,708 square feet of rental area, representing a 33 per cent increase in a period of six years. The surveys, of course, include the old as well as the new office buildings. As time goes on the average size will increase still further, it is indicated, by the listing in the January 1, 1930, survey of new buildings under construction in more than 40 of the major cities of the United States. These new buildings have an average rental area of 217,151 square feet.

The trend toward larger buildings is also demonstrated in the experience of the Building Planning Service of the National Association of Building Owners and Managers. This service, established seven years ago to provide architects and owners of building projects with the viewpoint of experienced building managers, as the final test of the economic worth of building projects, has analyzed building plans from an operative standpoint for owners and architects in 41 cities of the United States and four Canadian cities. The average of the buildings was 211,076 square feet of rental area. This figure is remarkably close to the average size of the new buildings under construction as reported by the January 1, 1930, rental survey.

The improvement of illumination and ventilation has contributed to the utilization of office building space. Fifteen years ago, it was deemed necessary that 110 square feet of floor area be provided for each person in the office. Ten years later, it was conceded that 100 square feet were adequate, and a survey made at that time in the financial district of New York proved this to be common practice. Some of the more recently constructed buildings have been designed on a basis of allotting to each occupant 90 square feet.

What has made the skyscraper possible? That it is a component part of the business structure of the nation is attested to by the thousands of tall buildings to be found in the business centers of America's leading cities. The value of the lands and buildings represents an aggregate investment of more than seven billion dollars, making the office building business one of America's greatest industries. It is greater than the automobile industry, as great as the steel industry, and half as great as the railroad industry in amount of capital invested. The significance of these facts is often lost to view because of the individual characteristics of each office building and its management. There is collective thought and action, however, in the office building business, since the management of the principal buildings of the United States is united in the common cause of developing the highest standards of service, maximum utility and profitable operation of the buildings.

The industry does more than furnish the abode of the business of the nation. It is a contributing factor to the greatness of the nation. The intensive utilization of land made possible by the skyscraper has increased its valuation to figures which would have been unbelievable before the advent of the tall building. These high valuations have produced a high revenue to the government in taxes. Often the office building owners have been victimized in the matter of taxation and have been forced in some cities to assume more than their fair share of this burden. This has been due to political reasons to a great extent, since business districts have but few voters, so a shift of taxes from outlying districts to the central business districts has become a favorite and frequent piece of political manœuvering. In this way, the skyscraper has done more than its reasonable share in contributing to the coffers of the tax-spending bodies. An idea of the tax burden of the office building industry may be gained from the most recent Experience Exchange Report of the National Association of Building Owners and Managers, which shows that, out of every dollar collected in the form of rentals, 16 cents is paid out in taxes, the largest single item in the expense of operating an office building.

The story of the skyscraper is that of continuing progress. Already the first of the skyscrapers are disappearing, and their places are being taken by structures that are elevating the skylines of American cities. The inexorable laws of economics which brought the skyscraper into being 40 years ago are operating to replace these original buildings with structures of greater heights and greater cubage. Nothing should be done in the way of legislating against the fundamental factors which made the skyscraper possible. Such legislation is more than a blow to the office building itself; it is a blow struck against the economic system which has brought America to the fore among the nations of the world. America's symbol is the skyscraper. It represents the progressive spirit of the nation, the vigor to get things done and the tenacity of purpose to keep everlastingly on the upward path. The skyscraper bespeaks the power and glory of the American people and nation.

FACTORS IN OFFICE BUILDING PLANNING

BY

JAMES B. NEWMAN

OF THE FIRM OF ELY JACQUES KAHN

DURING the building boom of the past few years there have been erected an unparalleled number of large structures. The interested observer has noted in the progress of this work an equally rapid development of the plan, the general character, and quality of the buildings.

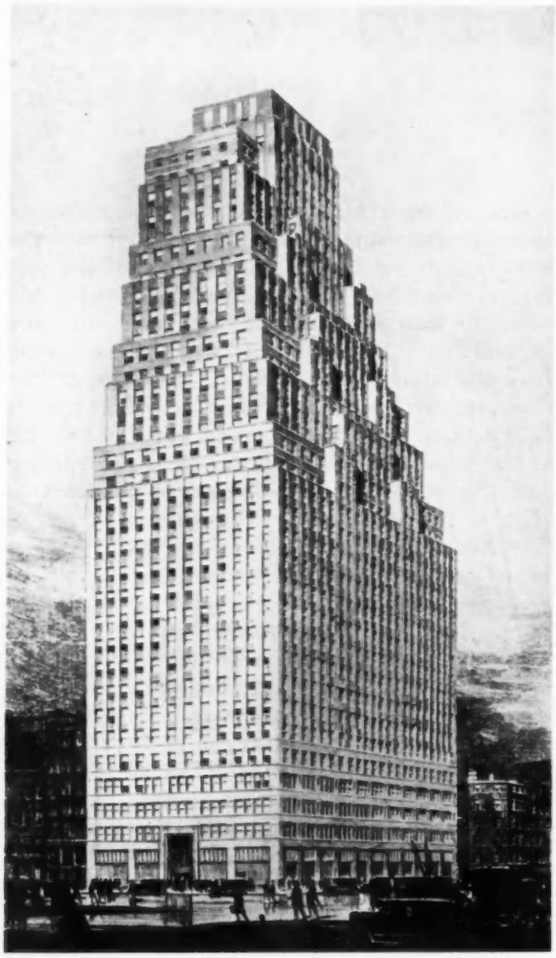
PLANS AND INVESTMENT. Just as the business enterprise of the past, with limited capital funds, has passed from the hands of the individual entrepreneur to great business organizations with complex financial structures, made possible through financial organization, so has the building of the present passed from the hands of individuals to syndicates backed up not only by their own funds, but by the much larger resources of the general community drawn upon through all of the known banking channels. The natural effort to secure the greatest possible return upon invested capital has led to the keenest of competition in the development of the plan, as the financial return is directly correlated with the efficiency of the plan. Because the financier is also immediately concerned with the safety of the capital funds which are tied up for a period of many years, he insists on the utmost flexibility of plan, so that in case of necessity the building may be rapidly and economically converted from one type and occupancy to another. This, in common parlance, means safety of investment through diversification.

PLANS AND PURPOSES. The plan of a large commercial structure obviously depends upon the purpose for which it is constructed, and the design of the building logically develops from the plan and its purpose. In this article attention will be centered upon several New York structures, as they embody not only the typical features common to the buildings of all large cities, but include additional features due to zoning laws, and they occur in such large numbers that all types of plans are available.

SITE AND BUILDING TYPE. For any given plot under consideration, casual attention is first given by the architect, as a rule, followed up by intensive group study, to determine the type of building most appropriate for the economic development of the site. In the actual solution of the problem, as a whole, this is a factor of the first magnitude, and calls for the exercise of the keenest judgment of realtors, who know the market demands; of the architect and his corps of trained assistants, who know the advantages and disadvantages of various plans; of the builder with his first-hand knowledge of the cost factors involved; and of the owner with his bankers, who determine the ultimate limits of expenditure. As a result of this combined study, decision is finally rendered as to whether the structure involved is to be an office building, with light and convenience of paramount importance, or a loft building with somewhat less convenience and with relatively large areas and deep spaces suitable for show rooms, light or heavy manufacturing, storage, etc. Decision is also reached as to whether the plans are to be developed primarily for one, two or several occupants per floor. If some large concern, occupying several floors, is to be accommodated, this will materially affect and probably definitely determine the major elements of the plan and the entire building. If the building happens to be one for a single occupant, this part of the problem is largely determined, and the structure is erected to meet the needs of this occupant, with only such consideration given to general planning as will insure proper placing of services so that the occupant can dispose of the property if the necessity for so doing should arise.

TIME FACTOR. Views so divergent are sometimes presented at these meetings that a final decision cannot be immediately reached. The plan develops as a compromise, and is altered from time to time, on paper, as circumstances require. Three sets of plans were well developed for the Squibb Building at Fifth Avenue and 58th Street before all groups were fully satisfied, and it can be said without much exaggeration that *time* is sometimes a powerful factor in forcing a decision. If a decision cannot be reached at all, frequently the building is so erected that it may be considered a "border line" structure between two classes, and with provision made to convert it to one class or the other.

THE LOT. To leave the building committee, whose influence is active throughout the entire project, and to return to the building plan, a most potent factor in its development is the character of the lot itself, and according to its size, type and general zoning restrictions, plans of varying characteristics may be developed. For this analysis, the site discussed may be classified as an interior lot, fronting on a single street, of



120 Wall Street Building, New York
The Firm of Ely Jacques Kahn, Architects

narrow, average, or of very substantial width; an interior lot running from street to street; a corner site; a block front site fronting on three streets; or a complete block with light on all sides. For each of these plots, a certain general type of plan usually develops more efficiently and satisfactorily than others.

ZONING DIAGRAMS. The first essential step is the preparation of the zoning diagrams, which consist of a section with the enveloping limiting lines, with the set-backs, and a composite plan with all the set-back stories superimposed in true geometrical relationship on the full plan of the lot. Such zoning diagrams are shown in this article for the 120 Wall Street Building. Figures 17 and 18. The story heights used in the preliminary diagram are generally taken, as they have proved satisfactory in other similar work. The typical floor-to-floor height in loft buildings is 11 feet, 6 inches. In narrow lots this is occasionally shaded to 11 feet, 3 inches or even to 11 feet. With large open floors, where the visual impression of 11 feet, 6 inches would be unsatisfactory, the height is sometimes increased possibly to 12 feet. In office buildings with lighter framing, and frequently no sprinklers, heights are often taken about 3 inches less than in loft floors of corresponding area. The first story, if mezzanines are to be provided, runs from 19 to 20 feet on the average, while second stories, having excellent display windows, frequently run from 12 to 13 feet. The order sometimes is reversed and the second becomes the high story, suitable for a bank, trust company or other such tenant, while with many clients walking up, the first story height becomes about 14 feet. If it cannot be

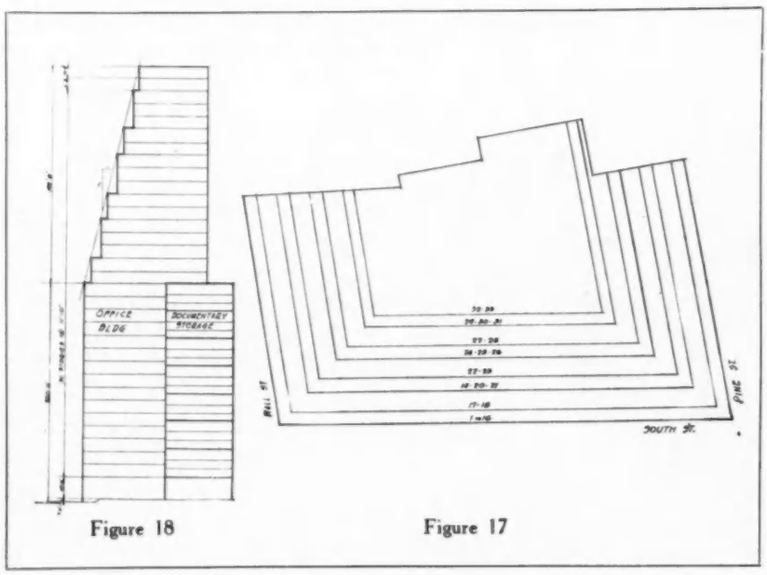


Figure 18 Figure 17

Zoning Diagrams
120 Wall Street Building

Section with enveloping, limiting lines, with the setbacks, and composite plan with the setback stories superimposed in true relationship to the plan of the lot.

determined what tenant may desire the space, the first and second stories are sometimes taken nominally at about 14 and 12 feet, and columns are figured heavy enough so that if a tenant comes later who wants a high story, the intermediate framing in his area can be removed, and two stories be thrown into one. This was done in the case of the quarters of the Sterling National Bank in the Chanin Building, and much the same arrangement was followed in the new Bricken Building at Broadway and 39th Street (Plate 150, page 813, Part One).

SETBACKS. Two stories are generally taken at each set-back in the case of smaller lots, while set-backs of about half a bay are indicated in larger buildings of considerable height. This affords a reasonable maximum floor area in the preliminary set-up, and indicates roughly about what area and cubage can be sacrified, if it is decided to voluntarily give up space in taking set-backs at column lines, or as may be otherwise necessary to get a well proportioned mass.

AREA CALCULATIONS. The tentative gross area of the building is calculated from the zoning diagram, usually without courts, as at this stage it is not always certain where courts will occur, if at all. Dormer allowances are also neglected in the preliminary set-up, as their use depends upon ultimate development of the plan and elevations. The net area is usually assumed as a certain percentage of the gross, roughly from 75 to 80 per cent, depending upon the extent to which the plan is broken up. In making the computations of areas it is necessary to assume some limit to the building height. In preliminary computations this is largely a matter of zoning diagram observation. When gross areas work down to within 4,000 to 5,000 feet, the danger line is approaching. If the allowable tower area, 25 per cent of the lot, is somewhere in this vicinity, an arbitrary tentative limit can be set, and this limit can then be later varied if calculations indicate that it is desirable.

ELEVATOR FACTOR. With tentative net areas and heights from the zoning diagram, the number and placing of the elevators are determined. If the sketch under consideration is for an office building, the total number of cars is roughly determined by a rule of thumb method by dividing the net rentable area from the second floor to the top by 25,000. This rule, determined by earlier types of buildings and equipment, is nevertheless fair enough for the preliminary studies. If there are enough elevators, they are so broken up into banks that each carries its equitable share of the floor area, while serving a reasonable number of floors, and the intermediate machine rooms are placed as much as possible where the disposition of areas under the zoning law is favorable. When the plan reaches a point where more refined calculations are necessary, the population of the building is determined on an assumed density, and enough elevators are provided to take care of the peak loads at morning, noon, and night, at reasonable intervals of time. Time intervals range from 15 seconds, which is excellent, to a minute for some towers, which is poor. Intervals of 30 seconds are good.

The Squibb Building, New York
Firm of Ely Jacques Kahn, Architects

HOW ELEVATORS WERE FIGURED. The occupancy of the 120 Wall Street Building was figured at the rate of one person to each 90 square feet, and at the morning peak, one-eighth of the entire number of occupants can be carried in five minutes. The high rise group of five cars serving 12 floors has an interval of 29 seconds. The six local elevators in the same building have

an interval of 18 seconds, the difference being due partly to the extra car, and partly to the shorter run. This shows why elevator requirements increase so rapidly as the building height increases, and why tower occupants must necessarily be satisfied with somewhat longer intervals. The new Adler Building (Plate 141, page 795 Part One), under construction at Broadway and 41st Street, will be 40 stories, and the net area of each tower floor will be only 2,500 square feet. Four elevators are being used for the tower portion to reduce the interval to 35 seconds, although on occupancy three cars are more than sufficient.

LOFT ELEVATORS. In loft buildings, the most satisfactory way of determining the number and type of elevators required is by comparing the structure with others of similar characteristics, the uppermost total approaching the number required for an office building of the same size, but with a substantial proportion of the cars being used for freight. In such buildings good quality combination elevators are commonly used to carry both factory employes and freight. With factory employes usually constituting a substantial proportion of the total occupancy, passenger occupancy requirements are much reduced and the time interval is usually long. This has been the theory in the past, but it is easily noted now in an ever-increasing competition for tenants, that much higher grade installations are being made in loft buildings. If there is any doubt as to the number of elevators which should be provided, the framing may provide for extra shafts or blank shafts may be constructed.

SERVICE ELEMENTS, STAIRS. Other service elements in the plan are readily determined, although there is question as to their disposition. As a general rule, in office and loft buildings there is at least one stairway and one fire tower stairway, the total number depending upon the occupancy. The minimum required width between strings is 3 feet, 8 inches, and with landings the space occupied by a stairway in the typical story is approximately 8 x 18. According to code regulations, such a stairway will provide for an occupancy of approximately 50 people per floor, if unsprinklered, or 100 people per floor if the building is sprinklered; or, roughly, the two required stairways will take care of office floors having up to 12,500 square feet and loft floors up to 25,000 square feet. If further facilities are required, additional stair lines can be installed or 3-foot, 8-inch stairs can be increased in width by increments of 1 foot, 10 inches, whichever appears more desirable in the plan. In nonsprinklered floors no point in the floor area should be over 100 feet from a stairway, while in a sprinklered building this distance may be stretched to 150 feet. If public corridors are provided, giving easy egress from remote sections, this distance can be increased at the discretion of the authorities. The stairways should also be remote from one another or at least so arranged as to easily tap different sections of floor area. As floors diminish in area, some of the extra stairways can be eliminated. In the new Adler Building, as the net area of each tower floor is only 2,500 square feet, the fire tower stairway only is required in this portion of the building. Floor landings in loft buildings should be roomy, because service lines such as sprinkler risers, standpipes, and frequently meters, are placed here.

TOILET FACILITIES. The number of toilet fixtures may also be computed and installed as provided by law for the given occupancy, but often they are installed in smaller numbers on the theory that toilet rooms can be easily enlarged if required. In office buildings there is often only one set of general toilet rooms per floor. In good grade buildings, it is becoming common, almost, to see not only high grade fixtures, but also chromium fittings, wainscots and stalls of carrera glass, fine floor tiles, etc. Basin risers, always provided in office buildings, are seldom provided in loft buildings. Provision is often made in loft buildings for as many sets of toilets as it is assumed there may be tenants, because executives generally do not care to have their employes mix with those of others. Provision is usually made for private toilet rooms and occasionally for still other groups for office employes. With so many uncertain factors to consider, many builders provide for a general arrangement that seems reasonable to them, but do not install nor show the arrangement on the renting plans. The tenant is shown where the stacks and vent shafts are, and is told that within reason toilet facilities will be installed as required.

OTHER SERVICES. The remaining plan elements are the shafts for various mechanical uses, the flue, the porters' closets, etc. These are all important and if properly installed contribute considerably to the economical maintenance of the building. Smoke flues frequently are installed, even if the building is heated from public utilities, to provide for ultimate contingencies. In reducing floors under the zoning law it is sometimes desirable to shift flues and shafts, and within moderation this can be done. If possible they should be so arranged as to avoid this.

SPECIFIC EXAMPLES OF ANALYSIS

With a general knowledge of all the utility components of the plan, specific examples will be next considered, using the lot analyses noted.

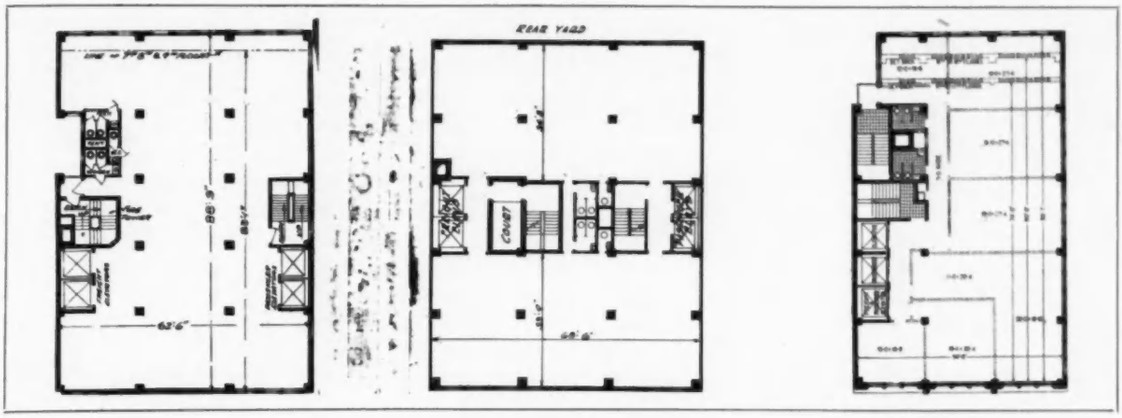


Figure 1
15-19 West 39th Street

Figure 2
247 West 35th Street

Figure 3
24 West 40th Street

LOT ANALYSIS. Interior lots, with single street fronts, are very commonly used for loft buildings. In the conventional treatment, the passenger elevators and general stairs are placed on one side, with the freight elevators, fire tower stairs, and toilet rooms on the other, as illustrated at 15-19 West 39th Street (Fig. 1). The elevators and stairs are placed near the center of the lot, favoring the front, if possible under zoning, to cut the length of travel from the entrance doors in the first story, and the travel to the show room in the loft. This arrangement leaves the light area free of encumbrances, provides for simple set-backs, makes a very satisfactory open floor for a single tenant, and provides for a front and back loft without crossing of freight and passengers. In this plan, the toilet rooms are not only provided with mechanical ventilation, but also vent onto the fire tower court. This court at the extreme side has walls on only three sides, and is economical to construct, besides disappearing in upper floors.

AN INTERIOR LOT DEVELOPMENT. An interesting development of this plan is that of 247 West 35th Street, in which all of the utilities have been placed in the dark band through the center of the lot, providing for two small lofts of approximately equal size. The stairs were shifted out of the way in the first story on a mezzanine, and with the fire tower court and toilets starting at the second floor, the first floor store runs clear through, with the freight and passenger entrances at opposite sides as before. Tenants in many cases eliminated the through corridor at the toilet rooms, also the private toilet, and used instead two sets of toilets on each side.

A NARROW LOT PLAN. Sometimes the interior lots to be developed are so narrow that all facilities are concentrated on one side, of which an example is the *Scientific American* Building (Fig. 3), at 24 West 40th Street. This plan is especially desirable if the light happens to be good on one side. In a plan such as this, the service elevator may be placed nearest the street, as a corner post car, and be provided with a service corridor to the street in the first story; or a sidewalk lift may be used, and freight be shunted across in the basement to the innermost car. This latter scheme was followed in the Rolls Royce Building at 32-34 East 57th Street.

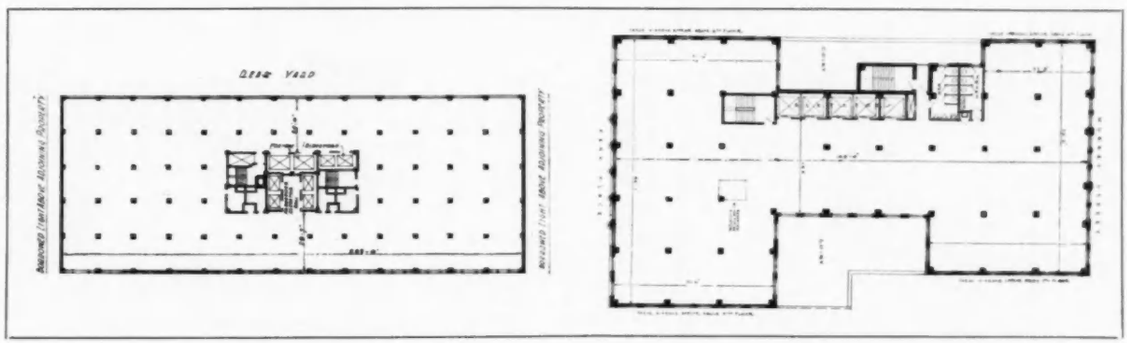


Figure 4
Allied Arts Building

Figure 5
Park-Murray Building

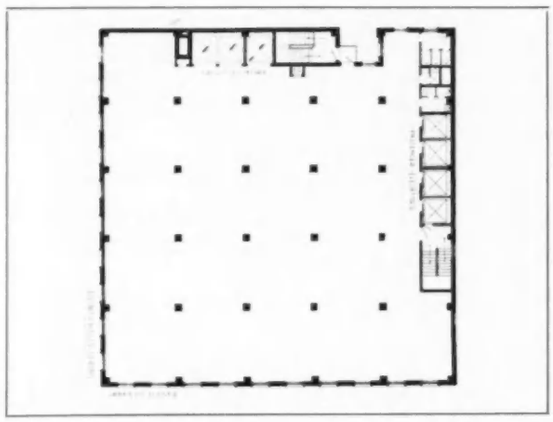


Figure 6. Seventh Avenue and 39th Street

A WIDE INTERIOR LOT. With wide interior lots, as in the case of the Allied Arts Building, 304-310 East 45th Street (Fig. 4), it may be advantageous to concentrate the entire service unit in the center. This makes an ideal division for two tenants, but for further division a corridor must be provided around the center utility group, resulting in some crossing of freight and passenger traffic. This latter can be avoided, and four tenants be provided for by carrying the passenger hall through between two groups of freight elevators. In upper floors, due to set-backs, the space between the elevators and the front wall becomes practically only a passage. In this particular building, to avoid this difficulty, the two elevators nearest the street were dropped off in the upper stories, and the toilet rooms shifted to the side. Time intervals in such buildings cannot even be discussed.

STREET TO STREET LOT. For an interior lot, running from street to street, the Park-Murray Building, 9-15 Park Place, 8-12 Murray Street (Fig. 5), affords a typical example, in this case the development being an office building. The light is protected on each side, but with the large legal court on the south side, irreparable damage would not be done should the light protection be lost. The court at the rear of the elevators, while not legally required, insures light and air to service units and is of some benefit to the office space. Consideration was given at one time to eliminating this court and placing the elevators at the lot line, but this would have required deepening the opposite court. This would have been done, as a matter of fact, if the building had been built high enough to have required the larger legal court on the south side. The practical necessity for an increasing interior court limits at once the height to which an office building can be erected on an interior lot, because as the height increases, the court is pinched between the lot line and tower, and the tower can go only to the height for which the available court will figure.

ONE OR TWO TENANTS. The plan of the building at the northwest corner of Seventh Avenue and 39th Street, Fig. 6, is a typical example of a layout for one tenant. It gives the maximum open area, utilizes the full light on the two street fronts, and leaves the maximum store area available either as a whole or in divided units. The passenger and freight entrances may be widely separated. Structural units easily carry to the top without set-back interference.

The plan of the building at the northwest corner of Sixth Avenue and 37th Street (Fig. 7), provides for two tenants per floor without crossing of freight or passenger traffic, and makes use of lot line windows, and likewise has all of the satisfactory features ascribed to Fig. 6. This latter plan has three windows per bay, which though more common in lofts, do not provide for center division of bays.

PICTORIAL REVIEW BUILDING REPLACED. The last two buildings are 23 stories high,

Figure 7. Sixth Avenue and 37th Street

Figure 8. 530 Seventh Avenue

and are on lots about 100 feet square. Higher buildings on larger lots are next to be considered, and of these the 530 Seventh Avenue loft building, Fig. 8, is an interesting example. It replaced the old Pictorial Review Building. Here is an example of the obsolescence of a single-purpose building. The Pictorial Review was an extremely well constructed building, and comparatively new. It was built, however, for a special firm, and a special printing business. The columns, being approximately 16 feet on centers, were entirely too close, and the story heights, in the neighborhood of 16 feet, were entirely too high. The neighborhood had changed completely in the brief span of this building's life, and it was necessary to make a new construction investment with a commensurate return. When the new building was first under consideration, 30 stories high, an immediate problem was the installation of a 100 per cent sprinkler system, to secure the most favorable insurance rates, and to avoid irksome fire drill regulations, etc. There were no sprinkler heads on the market, approved by the Bureau of Fire Prevention, which would stand the hydrostatic pressure with the tanks at the lofty bulkhead elevation. The simple engineering solution consisted of providing an intermediate system of pressure and gravity tanks supplying the sprinkler heads in the lower half, and another set of tanks in the bulkhead supplying the upper half. The two systems are not cross-connected in any way, and each is fed from the street through clearly identified independent siamese connections, and each has its own set of pumps. On the weight of engineering advice, this type of installation was approved by municipal authorities and is becoming quite common.

ELEVATORS. Eight passenger cars were arranged in two banks, with an ample freight corridor separating them from five service cars. The arrangement provides for two occupants per floor without freight interference. The utilities were set as far back as conveniently possible from both avenue and street, leaving approximately two bays at the west lot line, necessary for efficient use of the space. The local elevators drop out before progressing far into the setback floors, allowing the stairs to set back and with the fire tower and the express elevators to form a core drawn tightly into the inner section of the plan, permitting maximum height to be obtained. Of two general sets of toilet rooms, one, on local floors, was placed in the alcove between the express elevators. This means both a local and an express night car, but the space saved more than compensates for this additional expense.

There is not much likelihood that this structure will ever be used as an office building, but if such a development does take place, then the elevator alcoves of the first story would be cut through into the freight hall, and the local combination cars would operate with the local passengers, and the high rise combination elevators would work with the express passenger cars. The upper floors would be suitable for small office spaces, the lower floors being suitable for large office areas.

TRUCK LOADING. The owner also wisely provided a truck space and an ample loading platform so that cars could back in, and keep their loads from the sidewalk.

THE SQUIBB BUILDING. The Squibb Building at Fifth Avenue and 58th Street is a corner office building on which the owner freely spent money and time to insure that it would be an office building of the highest type, fully worthy of the location, and the success the building has enjoyed in renting is a reward of the owner's

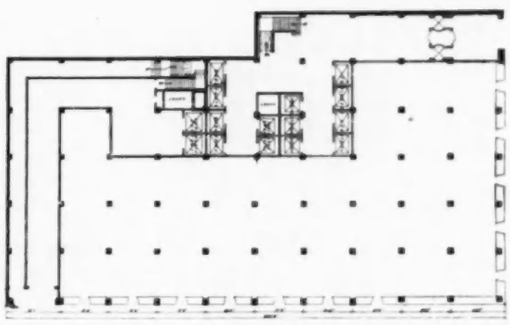


Figure 10

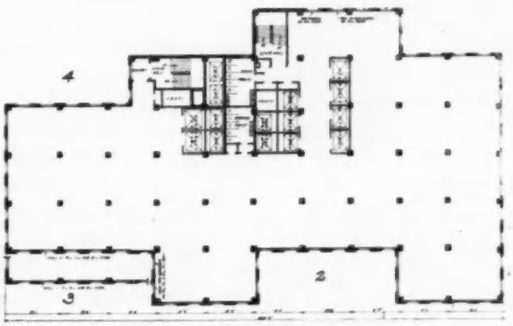


Figure 11

Figure 12

The Squibb Building, New York

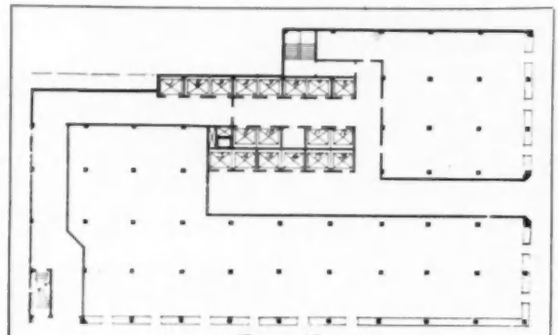


Figure 13

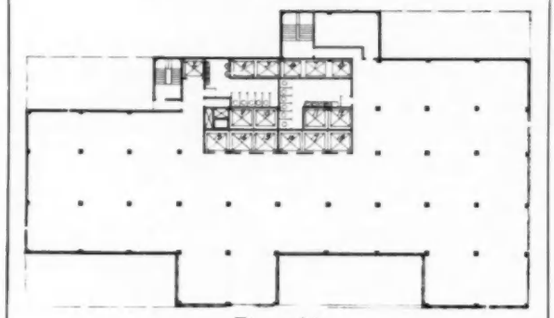


Figure 14

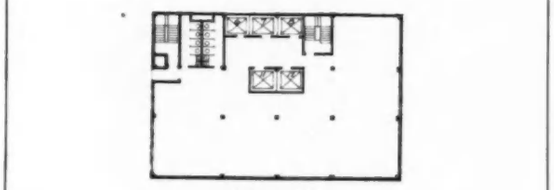


Figure 15

The Squibb Building, New York

optimism. The general features of the plan as finally carried out are shown in Figures 10-12.

There was most intensive study and inquiry to determine the plan basis. A question of immediate concern was how to develop the lot devoting the minimum area to courts, and at the same time develop a high grade building. Considerable work was done toward preparing a plan suitable for a department store which would take care of the several normally darker lower floors. Abandoning this idea, many office building sketches were tried out. The separation of the store area into two parts, at this location, and probable congestion and confusion due to elevator arrangements constitute serious weaknesses in the alternate first floor plan. The typical plan has some points in its favor, but the offset floors did not divide up well. The alternate tower plan is better in some respects than that actually constructed. In the latter the service unit approaches 58th Street too closely. This developed from arrangements considered necessary in the typical plan, and as there were not many of the tower floors, and as it was considered that they would be let in one-floor units, no great concern was felt about the matter.

PLAN AS BUILT. Returning to the building as constructed, attention was concentrated on the typical plan, as it is this plan which makes or breaks a building. There were three set-back conditions applying to the lot. The set-backs for a portion 100 feet on the avenue by 150 feet on the street adjacent to the corner began 200 feet above the datum curb, for the southerly 18 feet on the avenue set-backs started 125 feet above datum, and for the rear 50 feet on the street set-backs started 120 feet above datum. The lower six stories were built full except for a rear yard, providing for tenants who wanted large amounts of space. Courts were placed at points 1 and 3, the vulnerable positions under the zoning requirements noted above. Court 2 was placed to throw light into the central space, while Court 4 was built to care for the rear. Exterior courts as 1, 2, and 3 cut into dark areas of lower stories, and, as set-backs occur, become smaller and finally disappear, leaving the full available area in upper floors. Interior courts, such as Number 4, increase as they go up, and definitely limit the height of the adjacent structure.

ELEVATORS. Thirteen signal-control elevators of the highest type have been installed, arranged in two banks, giving satisfactory intervals, and working well with the plans. Two freight elevators have been installed, serving the lower half.

Although it is an office building, sprinklers were installed in its lower two-thirds to secure favorable insurance rates for tenants who might have valuable stocks in the lower stories and shops in such a location. The building was constructed in accordance with all requirements of the New York Labor Law to provide for any ultimate contingency. It was filed, however, as an office building to relieve tenants of irksome regulations as to the size and swing of office doors, fire drills, etc.

SPRINKLERS, ETC. A sub-basement has been built with provision to install a heating and electric system, though it is actually heated by the public utility. Numerous ample shafts to take care of special requirements have been installed. The mechanical system was rounded out with a pipe story at the top of the tower.

MATERIALS. The building is of the same white marble and glazed brick as the other buildings in the square, "of simple lines, embodying in its character the modern note characteristic of contemporary life." The Benedict metal work of the front, with the great door feature, revolving doors, etc., will indefinitely preserve its luster.

BRICKEN TEXTILE BUILDING. The recently completed 33-story Bricken Textile Building, Fig. 9 (Plate 141, page 795, Part One), fronting on Broadway, Seventh Avenue and 41st Street, is based on exactly the same principles as 530 Seventh Avenue, and has exactly the same type of plan, with the added benefit of three streets for frontage. The sprinkler system, on the same basis, is the second of the type installed. There are the same number of elevators, but their capacity is somewhat greater to provide for the larger floor areas. There was considerable discussion as to the type of structure, some thinking an office building to be proper. The show room type of building, however, was provided, but it may be observed that the space is suitable for many types of offices.

THE 120 WALL STREET BUILDING, Fig. 16, occupying the block front on South Street from Wall to Pearl Street, was a pioneer in the lower Wall Street region.

UNIQUE STORAGE PLAN. The zoning diagrams, Figs. 17 and 18, show favorable setbacks. It was proposed to devote this rear area to a documentary storage area serving the large banks, insurance, and financial houses of the nearby districts. These storage files were to be constructed as in a library, the stacks taking transfer files instead of books. The entire construction was to be erected in a fireproof shell, of unfireproofed steel and floor plate, each story being about 7 feet in the clear. The building department would not allow the installation unless fireproofed throughout, even though structural slabs were installed every second story. The stack scheme was abandoned, therefore, as it was not an economically feasible venture on this basis. The typical plan, Fig. 16, was finally selected, and certain additional plots, which were leased, measurably protect the rear lot line.

FOUNDATIONS. It was known that soil conditions were bad, and that pneumatic caissons would be required to rock at depths of approximately 80 and 90 feet below grade. As such caisson work is costly, it was advantageous to provide long spans and reduce the number of columns to a minimum. A comparison of Figs. 16 and 20 will show the great reduction made. The deeper girders required higher stories. The increased cost due to the greater cubage, additional steel tonnage, etc., was more than offset by caisson saving, and at the same time, the tenants benefited by the more open floor.

ELEVATORS. There are 16 signal control cars and framing provides for two additional elevators. The cars were arranged in three banks, reducing the floors served per bank, and also early releasing area confined to the elevator hall.

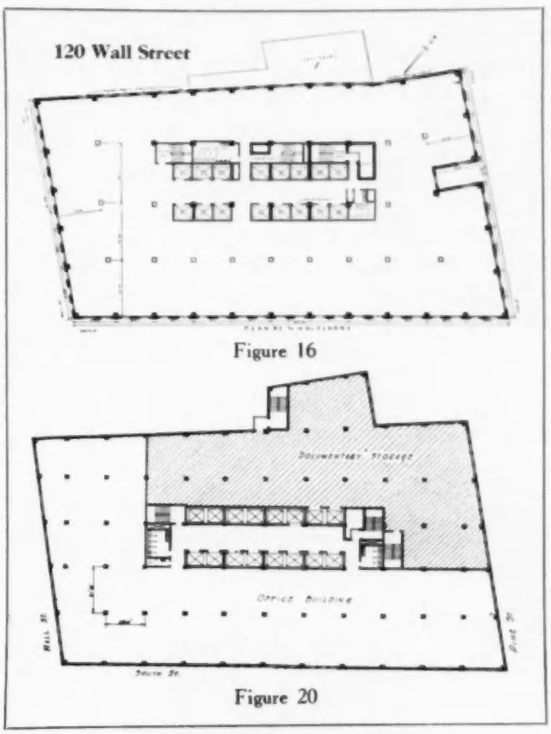


Figure 16

Figure 20

120 Wall Street, New York

With such an installation there is always necessary something of a compromise between the width required in the first floor and that required in upper floors. With the dropping out of elevator group 1 to 6, followed by 12 to 16, much more room is provided for offsets on the Wall and South Street sides, and the Pine Street side was sacrificed in the upper stories, as the least valuable. The small Pine Street court is the result of there being an uncertain title to the area so indicated, due to a faulty conveyance of approximately 100 years ago. The first floor was raised 3 feet above grade to provide depth to the basement without going too far below the ground water line, which occurs relatively near the surface. No vaults were developed, and girders were placed around the outer walls, spanning two bays between caissons, carrying the intermediate wall columns. This is a further example in caisson economy.

MATERIALS AND DESIGN. In regard to the building height, 33 stories were provided. If there had been a positive certainty that the building would rent as rapidly as it did, it would have been made 50 stories at least.

SUMMARY OF PLANNING PROCEDURE

Reviewing this analysis of the plan problem, it will be recalled that the location is carefully considered by a competent jury which determines

the desirable type of building; that a zoning diagram is prepared; tentative computations are made from which all of the service elements may be tentatively estimated; and a preliminary financial set-up made. On the basis of this information a preliminary sketch may be developed, starting with the typical plan as the basis, making such modifications as appear reasonable and desirable in working out the other floors. The way plans may be reasonably expected to develop on certain general types of lots has been pointed out. On the basis of the sketch, more accurate computations can be made for a further check upon services, and a more accurate financial set-up. If the scheme appears financially possible, further steps, not a part of this study, are taken to put through the deal, and if successful another building is under way.

2 Park Avenue, New York
Firm of Ely Jacques Kahn, Architects

BLOCK BUILDINGS. The tendency today is toward bigger and better buildings. Block developments are under way, and are going to increase in number because the problems of light and air can be better handled; there can be a more economical and rational treatment of service units, and arrangements can be more easily devised for proper handling of freight. More agreeable masses and more uniform treatments can be worked out, especially if certain faults with the zoning system are corrected. Block developments can be along more rational economic lines. It is obvious that if all business and economic barriers were swept aside, and two structures, such as those at Broadway and 38th Street and Broadway and 39th Street, now developing independently, were constructed as one and the same building, a more satisfactory and economical unit could be developed.

CONVERTIBLE BUILDINGS. In line with the ever-improving quality of big buildings, there has been a narrowing of the gap between office and loft structures, and many buildings as now constructed are suitable for either group. Lofts normally require deeper space, and while this difficulty is hard to get around, there can usually be found types of offices and show rooms which fit very well into the larger lower floors, leaving the upper floors for smaller units. The elevators in combination buildings must be so arranged that they can be used as either freight or passenger cars. In banks of elevators this is especially easy, as passengers can enter at one end of the bank, and freight can enter at the other, or the freight can be handled through basement driveways. As the need changes, cars can then be changed from one use to the other without even a structural change. Sprinklers are quite often installed in office buildings, and provision can easily be made for future installation. If sprinklers ever become unnecessary, they can be removed, and in many cases they have been. Additional plumbing lines can readily be installed in loft structures while building if conversion to an office building is considered likely.

So far as floor loads are concerned, recent code revisions in New York at least have made office loads plus partition allowance practically the same as loft loads where light manufacturing only is concerned. The problem of possible conversion from one type of building to another is usually seriously discussed in connection with the plan development of a structure, and this is just one other characteristic of the modern spirit of standardization and efficiency.

OFFICE BUILDINGS FROM AN INVESTMENT STANDPOINT

BY
C. F. PALMER
PRESIDENT, PALMER PROPERTIES, ATLANTA

THE subject of office buildings from the investment standpoint may be subdivided into three main classes: (1) Good; (2) Bad; (3) Indifferent. If the purpose be to record the history of individual properties, then a long article should be devoted to Class 3, the indifferent (from the investment standpoint);—to Number 2, the bad;—and a brief coverage to Number 1, the good. Such an allocation would be based on quantitative history. The bad investments in office buildings outnumber the good, while the indifferent form by far the largest class. Why? Because until recent years the high type of business judgment used in other major commercial undertakings involving the investment of capital had not been applied in the office building field.

Thirty years ago a building failure was somewhat excusable. Large structures were then pioneers. No adequate history of earnings over long periods of time was available. The operating end,—that which corresponds to production in manufacturing,—was still in a state of flux with few standard practices. The renting or selling end was equally experimental. The building owner did not know what his market demanded, because that market itself did not know its own needs. No wonder that grief came to the owner, —and that meant grief to the architect, because the successful architect is he who has made his clients succeed. In the office building field the demand can be accurately determined. This demand must be properly appraised. An idle race horse has a great appetite. An empty office building means spending such an amount of capital in meeting its fixed charges that it frequently fails before it has had a chance to run the race.

THE "MONUMENTAL." Buildings of a monumental order are no longer being erected. Time was when ornamental structures created comment and discussion. Neither excessive height nor flamboyant decoration now creates more than passing interest, with the result that the purely monumental structure no longer serves its primary purpose,—to advertise the name of an individual or a business. It has so far lost its novelty that it is out of place as a memorial to a big business leader or to a large corporation to increase his or its prestige in the field of economics.

THE "PROMOTIONAL." Also the purely promotional structure, which was conceived in the mind of a real estate broker to sell the land for a commission, by the architect to design the building for a commission, by the contractor to build the building for a commission, by the loan agent to finance the building for a commission, by the renting agent to rent the building for a commission, has universally come to grief.

ANALYSIS. But enough of the negative side. Today attaining success should be the rule. But it can be the rule only if the architect and owner, in the solution of their problems, use the facilities now available to them. They must analyze and study a million dollar office building for as long a period of time, with as much concentration and detailed revision as does the manufacturer in tests, analyzing his markets, designing his machinery and planning his plant before he introduces an entirely new article into the domestic or foreign field. I know of an office building for which preliminary estimate drawings were under way over a year ago. They have been revised scores of times, and they will be changed many more times before work starts two years hence. Every angle of production, construction and use is being tested through intelligent channels. Prudent business men and skilled architects frequently insure the right solution by such an approach to the office building problem. I know of another office building in another city where the plans were being drawn as the footings were being placed. A $450,000 first mortgage gobbled up this entire $2,500,000 investment before the structure was four years old. Still another unfortunate structure changed hands for less than $500,000, although its first mortgage was about twice that amount. Both of these failures were born, died and were buried within the past five years. Neither would have encountered such experiences if proper, positive action had been taken in the preliminary stages.

THE MARKET INVESTIGATION. The first investigation must be of the extent and type of the market. The extent can be determined through an investment banker who will probably have on file from the National Association of Building Owners and Managers the most recent office building vacancy survey, giving facts such as were presented by President Paul Robertson of that Association at the recent Hoover Conference. An excerpt of that report says: "On October 1,

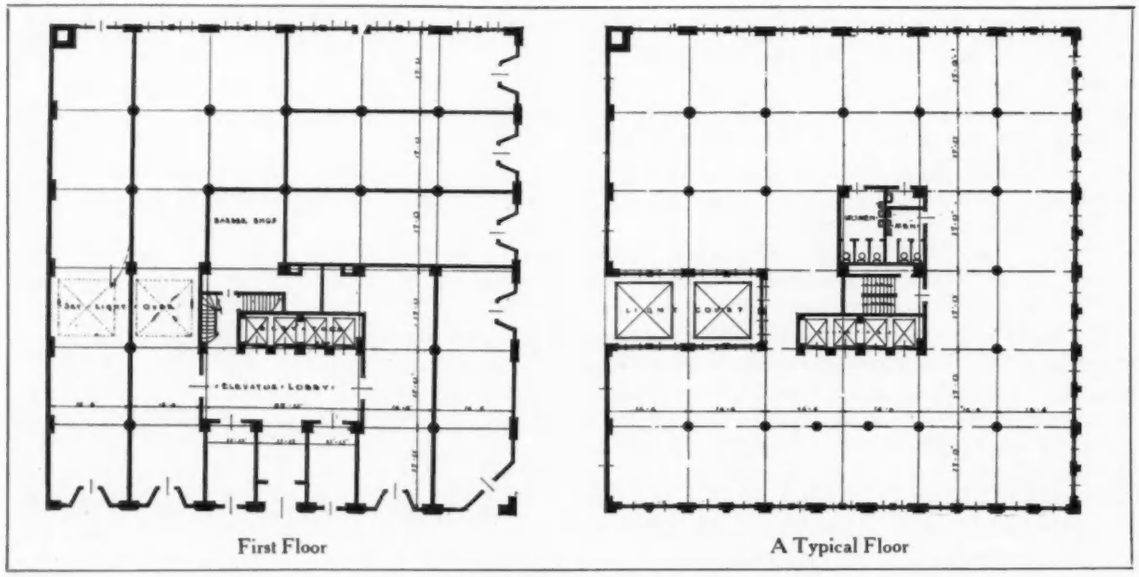
1929, we had a vacancy of 11.55 per cent in space, with $250,000,000 worth under construction. Based on past absorption rates, we face a probable vacancy of 16 per cent on May 1, 1930. That this figure is justified is indicated by our January 1, 1930, survey, exhaustively covering 23 cities, showing a present vacancy of 14.57 per cent. This means that by May 1, 1930, there will be over $500,000,000 of stagnant capital in our business. The field is over-built." National as well as local figures of many years' experience form barometers of present as well as future demands.

OFFICE SIZES AND DEPTHS. The type of the market needs equally close attention. An office about 8 or 9 feet wide satisfies 83 per cent of the business occupants of office buildings in Chicago, 72 per cent of those in Jacksonville, Fla., and 89.7 per cent of those who occupy office building space in Atlanta. In other words, in most markets we find that a room 10 feet wide and 20 feet deep will serve the majority of requirements almost as readily as one 15 feet wide by 30 feet deep. This is particularly true in the southern states. The smaller unit has only four-ninths as many square feet of floor space as the larger unit, and yet in many cases it will command nearly the same price per month.

Exhaustive research in one of the largest cities in the United States showed that 45 per cent of a building there should have rental area 20 feet deep, 45 per cent 25 feet deep, and 10 per cent 30 feet deep or more. Let me show how depths affect rentability by taking mythical building "A" with offices 10 x 20, giving 200 square feet with $3 rental per square foot, totaling $600 per year, or $50 per month. We compare this with mythical building "B" for space 10 x 30 or 300 square feet at $3 per square foot, totaling $900 per year, or $75 per month,—but do you think for a minute that a tenant will pay that additional 50 per cent or $25 a month for one-half again as much space in building "B" as in building "A" when all of the additional area is 20 feet or more from a window? Of course he won't. Usually building "B" will have to rent its space at practically the $50 price. which then gives $2 instead of $3 per square foot. However, it costs just as much to build a square foot of office space away from a window as it does close to the window. Here is the result: Building "A" gets $3 per square foot, while building "B" gets $2, although each required practically the same investment per square foot.

Let's return to the original findings which showed that 45 per cent of the space should be 20 feet deep, 45 per cent 25 feet deep, and 10 per cent 30 feet deep, and let us assume that the converse was constructed, giving 45 per cent of its space 30 feet deep instead of 20 feet deep, 45 per cent 25 feet deep, and only 10 per cent of it 20 feet deep. We then find that such a structure, merely because of having wrong office depths, would bring in only 80 per cent of the gross revenue produced by one with proper depths, and this condition could not be corrected, no matter how efficient the manager might be, because revision in office depths is impossible. Quality is better than quantity.

The average office building opens 52 per cent rented, and then it takes five years for it to reach 90 per cent, which is generally considered normal.



First Floor A Typical Floor

101 Marietta Street Building, Atlanta
Burge & Stevens, Architects

101 Marietta Street, Atlanta. Burge & Stevens, Architects. General View, Showing Simplicity and Attractiveness of Exterior

Original financing must take those five lean years into account.

LAND COSTS. When we have found out the extent and type of the market, can we afford to build in it? Land costs help to determine that. We may find that a structure large enough to carry its proper proportion of the land value will create so much space the market will not economically absorb it. A recent statement has been made that it requires a 63-story building to get the maximum return out of $200 per square foot land, considering plot dimensions and various other contributing factors.

All such influences must be taken into account. A merchant must know his rate of turnover to his entire investment, the manufacturer his sales to plant costs, and the office building owner the economic square foot of net rentable area to produce the greatest return on his combined land and building investment.

Ground floor rentals for an office building in a retail, congested area may be 200 per cent above ground floor rentals for a similar office building a few blocks removed, while the difference in upper floor values may be less than 10 per cent between the two buildings. As with a normal office building we will get from 80 to 90 per cent of our gross above the first floor, it can readily be seen that high priced land does not always make the best site for such a structure.

TWO EXAMPLES. But instead of taking up these details one by one as applying to all buildings, let us consider two structures. The first will be of the monumental type, where original investment and eventual income were secondary in importance to impressive appearance. The second structure will be one where every penny invested was expended from the viewpoint of its dividend earning capacity. We must be able to appraise the structural character and see how it affects the operating expenses. Hence the detailed analyses are taken up of two distinctly different buildings.

HOW THE MONUMENTAL WAS BUILT. The first or monumental type was erected to commemorate the name of an individual or corporation. We examine the exterior. It is marble

F. & L. Photo Service

Elevator Entrance, Ground Floor, 101 Marietta Street, Atlanta. Burge & Stevens, Architects

and covered with costly hand carved ornament. The first floor is 20 feet high. The elevators run 700 feet a minute, and the building extends 15 stories above the street level. The second floor is 15 feet high from floor to ceiling. Each corridor, which is 8 feet wide, has windows at the end for natural light, and glass at a height of 7 feet above a marble wainscot gives additional borrowed light for each office along the corridor.

From the third to the 15th floor the ceilings are 12 feet high. Each typical office has three windows and is 15 feet wide by 30 feet deep. Drinking fountains operating ice water to the public in each corridor are highly carved and decorated. Offices are equipped with fancy ceiling fixtures for electric lights together with elaborate side bracket fixtures. Examination of the electrical plans shows each office floor on not more than three circuits, each floor including many offices. Communicating doors between offices are midway between the exterior walls and interior corridor walls. These subdividing partitions are 4-inch hollow tile. Each office has a chair rail around the wall. The building is "U" shaped, is on a corner with a 20-foot alley making three sites exposed to good light and air with the two legs of the "U" on the blind side. The opening of the light court made by the legs of the "U" is 15 feet wide by 30 feet deep in a building on a city lot approximately 100 feet square.

The building has two very elaborate and large toilets for men, one on the seventh floor and one on the 15th floor. A commodious rest room for women is on the eighth floor. All of these toilets have outside light and ventilation. The floors in the offices are of costly and carefully selected oak. In the basement the space under the sidewalks has been excavated and vault lights installed. Stairs of marble with bronze handrails go from floor to floor and have windows at each landing. Every conceivable item of machinery, from that generating the building's own power down to a $50 pump to help create a vacuum on the heating system is installed in the sub-basement. Between the 15th floor ceiling and the roof there is a 10-foot attic. This space is utilized for storage and locker rooms for the employes.

On the ground floor in the lobby a large brass directory is next to the elevators, giving the names and office numbers of tenants. In the center of the elevator bank is the mail chute. Fire hose in recessed cabinets are on each floor. Elevator gates are of open work bronze. The cabs have very expensive floor covering and are equipped with mirrors. Ceilings in the offices are suspended. Wash bowls in each office are enclosed in cabinets. Awnings are on each window. No cost has been spared by the owner, his architect or the contractor to put in every conceivable feature that might be placed in such a structure. The building could not be duplicated for $1 per cubic foot. So much for the monumental building.

HOW THE DIVIDEND TYPE WAS BUILT. Now let us get back to that other structure we are comparing with the monumental edifice just described. Remember that this is an office building in which each dollar of investment was spent primarily to return dividends. Sustained dividends are the largest factors in determining value.

Instead of marble, we find the exterior of the building a combination of terra cotta and limestone or brick. A pleasant effect is obtained by bold upright lines, and practically no ornament is used, as that means cost in installation and upkeep. The first floor is 15 feet high instead of 20 feet high. This gives enough room for a mezzanine floor and all usual commercial requirements and yet takes 25 per cent fewer cubic feet to produce. Instead of 15-foot ceilings on the second floor, we find them to be 10 feet, and doing the same work as the 15-foot height only with 33 1/3 per cent smaller cubic contents.

Instead of 700-feet-per-minute elevators, these run 450 feet per minute, which is about the maximum speed usable for a structure of this size. The slower cars cost at least 30 per cent less to install and 25 per cent less to maintain than the higher speed cars that never reach maximum

efficiency because of the low rise.

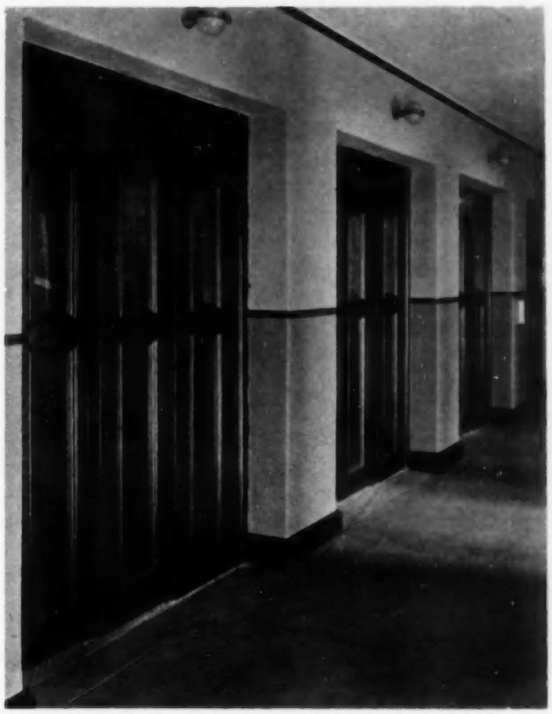
Instead of 8-foot corridors, we find them 5 or 6 feet wide. The other 2 or 3 feet have gone into rentable area,—dividend-producing space. No windows appear at the ends of these halls, because the corridors have been cut short, and the space thus obtained has been made into an office with natural light provided by the window. No borrowed light comes through the corridor partitions because such partitions are costly to install and maintain. A 5-foot marble wainscot is used instead of a wainscot 7 feet high. This results in a saving by using plaster instead of marble totaling about 80 per cent, and the substitution accomplishes practically the same results.

From the third to the 15th floor each ceiling is 10 feet high instead of 12 feet. Each typical office is 10 feet wide and 20 feet deep with a single window. It will be remembered that the other offices were 15 x 30 with three windows, a plan which presents an almost hopeless problem to resubdivide. One has 200 square feet at say $3 per square foot or $600 a year which makes $50 per month. The other has 450 square feet which at the same price would require $112.50 per month, and 30 per cent of its space would be over 20 feet from natural light.

A scientific study made of office depths by W. O. Ballard of W. H. Ballard & Company, Boston, showed on a unit a value of $3 per square foot at 15 feet deep, but the rental shrank to $2.40 at 30 feet and to $1.66 at 50 feet. Mr. Ballard also developed the fact that 72 per cent of all the office building space in Boston is occupied by firms using from one to five small offices. Thomas P. Danahey found that in 34 office buildings in Detroit 40.3 per cent of the number of tenants used 300 square feet of space or less. In other words, small offices command higher rentals and have fewer vacancies than large units.

No drinking water is in the halls, because it requires a circulating system and cooling plant costing thousands of dollars and attracting or holding not one tenant. One non-dust-collecting center ceiling fixture is in the office of the ideal building, with baseboard plugs for droplights instead of fancy side brackets. This layout furnishes the most economical electrical equipment. Every office is on a separate light circuit so that it can be metered individually and the tenants be charged for the current. This effects in operation a saving of thousands of dollars per annum.

Doors connecting offices are near the corridor partition instead of bisecting the distance from exterior to hall wall. Thus they are out of the way, in the darkest space, and allow for more flexible cross partition arrangements. Soundproof 2-inch walls, instead of 4-inch hollow tile save in rentable area and are less costly. No chair rail,



F. & L. Photo Service

Elevator Doors, Typical Floor, 101 Marietta Street, Atlanta. Burge & Stevens, Architects

which collects dust and rarely protects the wall from chair backs, is used. A light court larger than 15 x 30 is built.

Each floor has men's toilets, and every third floor has accommodations for women. It saves considerable elevator traffic where but a few central toilets are used, and the installation cost remains about the same. Every toilet is in the central nonrentable space, making available the class "A" area for office purposes.

Cement floors instead of hardwood are installed. No vault lights are used in the sidewalks. Stairs from floor to floor are of concrete instead of marble, and they are located in the nonrentable part of the building away from window space. Very little machinery is in the basement, since light and heat can be purchased from central plants at less than the cost of individual production. Instead of an attic of 10 feet, only 4 feet are used as an air space. The employes are cared for with their lockers in the basement. This saves 60 per cent in attic cubic contents.

Mail chutes and directory in the lobby are at one side so that they do not interfere with elevator traffic. Elevator gates are steel with wire glass instead of open work bronze, and instead of expensive floor covering heavy mats are in place on the floors. Beams on the ceiling of the offices are exposed, and wash bowls have no closets

around them. There are no awnings, as the tenant puts in his own Venetian blinds if he wants such equipment. This building can be built for 65 cents instead of $1 per cubic foot.

Eliminating light courts, the monumental building has 153,700 gross square feet, and the investment building has practically the same. However, let us recall those high ceilings and that high attic in the monumental building. They help to make the cubic contents 2,028,550 cubic feet, or 13.2 cubic feet to produce 1 square foot.

Our investment building has 1,587,000 cubic feet. Let us remember those low ceilings and that air space instead of an attic. This makes 10.3 cubic feet to produce 1 square foot in the investment building. In other words, it is seen that one structure may be very costly in its actual erection cost, while another building having the same rentable area and doing the same work and getting the same income will require considerably less capital investment, and so will be of more economic value.

But we actually find our monumental building costing $1 per cubic foot or $2,028,550 as against 65 cents or $1,031,550 for the dividend payer. In addition, we find the less costly building yielding a greater gross and net revenue because it has small and shallow offices, and has its utilities in dark spaces. It uses every bit of its class "A" space for rental purposes.

This comparison of buildings has not been overdrawn. There are hundreds of examples showing such diverging extremes, and so when we are told that an office building actually cost $2,000,000 it doesn't really mean that it is worth that much. Much capital may have been wasted. Next door there may be a $1,000,000 building actually worth more in dividend production and rentable area than its $2,000,000 neighbor.

Actual records of two real buildings in the east recently completed show one with 14.3 cubic feet per square foot of rentable area, while the other building has a total of 24 cubic feet per square foot of rentable area. Which is the better from the investment standpoint?

On one of these pages there is an illustration of a Simon-pure investment type of structure, 101 Marietta Street, one of the Palmer Properties in Atlanta, Burge & Stevens, architects, and Turner Construction Company, the contractors.

ACCOUNTING METHODS. Proper accounting methods of all operations are paramount when the structure has become a going concern. At a time when correct charges in a certain city took 61 per cent of the gross income, I have seen statements by misinformed,—rather I should say, uninformed,—promoters basing income estimates on a 25 per cent operating basis, or a variance of 140 per cent from the actual. Often such errors mean the difference between success and failure.

Many a man has been running his business at a loss without his knowledge because his accounting system was inadequate. No matter whether the projects be large or small, its books should be set up so that its items will be grouped into three classes, determined upon by the Experience Exchange of the National Association of Building Owners and Managers. These are called "A" accounts that cover operations; and "B" accounts that cover construction in connection with the building already completed; and "C" accounts, showing the fixed charges. If the books of even the smallest structure are kept in this way, they will allow comparison with many of the small sized structures throughout the nation, that are operating with similar problems. The Experience Exchange of 1928 considered 240 buildings in 56 cities with a total area of 26,266,431 square feet. We may say to ourselves, "Why, I am operating the heat in this building economically." But, if we kept our accounts in such a manner that we could make a comparison through the Experience Exchange with another building of similar size and conditions, we might find that we are very extravagant indeed.

The most helpful method of approach to the success of an office building from the investment standpoint is through the Building Planning Service of the National Association of Building Owners and Managers. Conceived in helpfulness for its own membership, this extraordinary channel for analytical studies is now available to anyone with an office building problem. It gives the experience of the men who are actually living with the structures architects and owners have created. In no way does it take the place of the architect. In its two- or three-day sessions it exhaustively analyzes over 300 separate items.

One approach exclusively to the investment analysis often used by this Building Planning Service takes 25 separate computations to reach comparative net incomes of various proposed plans. Another digest has 13 distinct operations to find comparative gross returns for various floor layouts. That scores of leaders in the architectural profession have utilized this service over and over again is the best indication of its value. Through its use the architect can help his client to succeed from the investment standpoint. Frequently it has placed an office building in the No. 1, "Good," class, when it might have gone into the No. 2, "Bad" or the No. 3, "Indifferent."

INCORPORATING A PARKING GARAGE IN THE OFFICE BUILDING

BY
OWEN N. H. OWENS
Chairman, Downtown Garage Committee
National Association of Building Owners and Managers

A GOOD many building operators, observing the trend toward the incorporation of garage facilities in office buildings, have been wondering whether the idea is a mere evanescent sputter, or whether it is basically and economically sound, indicating, in fact, the standard procedure of the future. I think we may fairly assume that it is not merely a bright idea or a passing sales device. It has its origin in the trends of the time. It is the solution of a definite problem. It is born of pressing economic and sociological forces.

Any man who owns a car, and penetrates with it into busy business or shopping centers, has found it time and time again quite difficult to get rid of his car when wanting to make a business call or a purchase. Who has not issued from his office and wondered where the dickens he left his car that morning? Who has not received an irritating communication from the authorities with reference to too great a proximity to a hydrant or an intersection, or too lighthearted an interpretation of a 60-minute parking sign? It is unfortunately clear that something has happened these last few years; something is out of joint; something has developed too fast,—or something else too slowly.

The problem has been created by a factor which is behind a great many other problems: concentration. Selling and distribution have been severely disjointed by concentration of manufacture in what amounts to a comparatively few factories in relation to our manufacturing habits of a few decades ago. The problem of how to live in respectable surroundings and still pay the rent has been created by the concentration of domiciles. The trouble is that the human race is becoming very rapidly more and more mass-minded, more herd-minded. Always gregarious, it is achieving the peaks of gregariousness. People hate to be alone. They hate to be isolated, either physically or in a social sense. They are eager to live as others live, where others live. They embrace the standardized life, with standardized tastes and standardized habits. And there is no satisfaction in being standardized unless there are a lot of people about to see you doing it.

TRANSPORTATION PARADOX. Progress in transportation, oddly enough, while apparently calculated to distribute people over a larger area, has had the effect of concentrating them even more. Nor has the rapidity of movement made possible by the automobile tended to relieve congestion in crowded centers. The automobile may be capable of offering transportation at 60 miles an hour; but it cannot make good its offer in such streets as it must travel, in the very districts where rapidity of movement is most important. The automobile has, in fact, considerably augmented the blocking of the arteries of communication. A city where automobiles were entirely denied access might well be an easier city to get about in than the average city of today. A bus or street car, carrying a score or more of persons, causes little more congestion than an automobile or a taxi carrying one.

With the growth of prosperity, vehicles of personal transportation have increased enormously in number, and to our detriment. Individually, when we are in our automobiles, we take up too much room on the streets for the public convenience and welfare. And when we park our cars, the space we consume is even more of a handicap to civic economy. We have indeed arrived at this paradox,—that the more convenient the location of a store or an office building, the more useless a car becomes. If we are content to use public vehicles, we can do so to and from a congested area. But the man who enjoys an automobile will often prefer to operate in a location where propinquity to important centers is sacrificed to the opportunity of finding a place on the roads for parking his car.

The man in search of offices is in a dilemma; either he and his staff must endure the discomforts and delays of public vehicles, or else locate in an inconvenient spot. If he goes close into the center of things, he must probably sacrifice the mobility and time saving which the use of a car can confer on him. Hence the office building with parking facilities incorporated. To my mind it is merely the logical solution to a very definite problem. Opinion among building operators is by no means whole-heartedly in agreement with the advisability of incorporating garages in office buildings. Many promoters of buildings, while making sure to provide, in other ways, the very latest facilities, have let this development lag

behind others. The reason is, I believe, a certain scepticism about the question of its being possible to make a combined garage and office building a paying proposition.

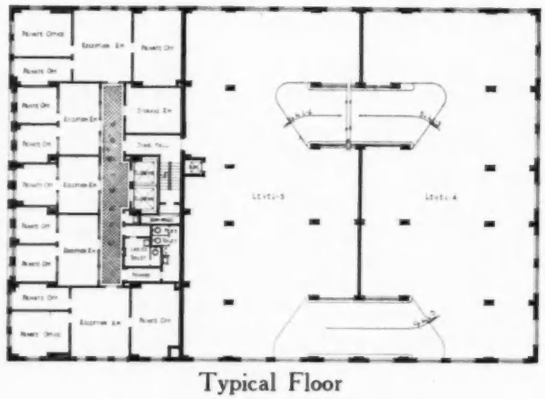
George J. Beggs, Vice-President of the Commonwealth Trust and Title Company gives his opinion thus: "As a matter of preference, if I were erecting a building, and I could arrange or help to arrange for some other property owner to build a garage adjoining my office building or very close thereto, I would feel that this was preferable to making the investment in my own property. The only exception to this statement would be where the location offered unusual opportunities for obtaining a large volume of transient custom, possibly one directly across the street from a major hotel or theater row. I believe that for the ordinary small sized garage, a substantial amount of the rental received therefrom is not applicable to net earnings, for the reason that some rental value attaches thereto, if basement space rental value attaches to the street area used as an approach thereto, and a deduction must be made to cover the increase in fire insurance rate. These items in some instances will consume practically all rental paid by the garage.

"On the other hand, a well designed garage is often helpful in stimulating office rentals and at good rates, and this is an equation which must be settled by the managing agent, as to whether he wishes to assign to the garage section of his building a credit which would tend to bolster up, theoretically, garage earnings for the benefit it has done the office portion of the building."

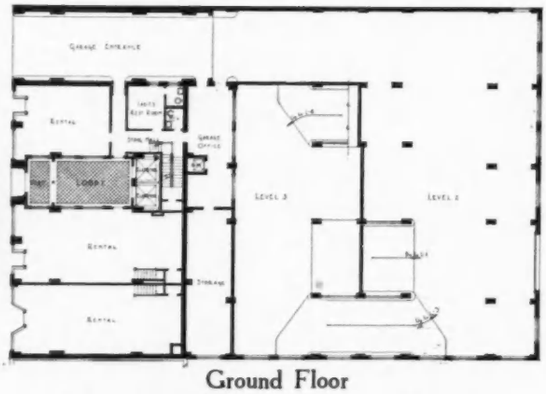
Speaking for the contrary opinion, I have a letter from Schmidt, Boucher & Overend, of Wichita, Kas., which runs in part: "We have been much interested in watching the results obtained in the Ellis & Singleton Building, which has a garage in connection, for the reason that it was built in the face of an over-supply of offices, and is also considerably out of the office building district. However, within two and one-half months after completion of the building it was 100 per cent rented, and the owners attribute this success to having the garage in connection."

Following the same line of thought is a report from Los Angeles, over the signature of Lemuel Freer, Manager of the Pacific Building: "We were the first in Los Angeles, probably on the Pacific coast, to put in garage service in connection with office buildings. We were very much criticized at the time for doing so, but I assure

Ellis & Singleton Building, Wichita.
Schmidt, Boucher & Overend, Architects



Typical Floor



Ground Floor

Ellis & Singleton Building, Wichita.
Schmidt, Boucher & Overend, Architects

you we found garage service in connection with office buildings to be very profitable, in fact so much so that we wouldn't consider, from any standpoint, building an office building without providing parking space for both tenants and patrons of the building. Besides proving successful in the Pacific Mutual Building, it has also proved a success in the Pacific Finance Building as well as in the Wilshire Medical Building, which was completed less than a year ago, and it is now 100 per cent rented due to no reason other than that we have provided adequate garage space for the tenants and patrons of the building."

PROFIT AND LOSS. The reader will notice a tendency to regard the garage largely as a means of filling the office building, and little mention of the question of profit or loss. The garage business, to the average building promoter, is a dark and uncharted sea. Perhaps it is this fact which has retarded the incorporation of garages in office buildings, and led to the inadequacies of some of the basement garages supplied. Will the garage section of such a building pay? Under the parking rates at present obtaining in the average city today, it is very questionable if it will pay. But that does not settle the matter by any means. It merely means that prevailing parking rates are too low. They are lower than the public will pay willingly in the future.

There is a lot of competition in the garage business. Cars may be parked at the curb and on vacant lots. In the former case, the community pays for the parking space. In the latter, the rate charged is usually figured to cover some of (and rarely all) the taxes on the lot. It very rarely makes any return on the investment. Such parking is irresponsible competition. Basement garages built beneath office buildings are often unsatisfactory. Space of this type is too often so inaccessible and the layout so cramped that it does not offer real convenience to the public, and consequently is not well patronized. There is at least one definite case on record where tenants of a building are preferring to walk two blocks to a better designed public garage than suffer the inconvenience of their own basement garage. Naturally, rates are cut.

It is, however, a matter of experience that a garage, properly located, properly planned and managed with some enlightenment, can obtain a rate which will offer a fair return on the investment. If erected in conjunction with an office building, the return will be found adequate to make good loss of revenue from store frontage, etc. There are signs that subsidized parking will one day be a thing of the past. The International Garage Association, at a recent meeting, sponsored the principle that it is bad business for anyone but the parker to pay the full cost of parking; and it is only a matter of time before this principle is put into effect.

FIGURING COST AND INCOME. It has not been particularly easy to figure costs and returns in advance of erecting a garage, but data are being collected. The old method was to estimate the investment on a cube basis, working out usually in the neighborhood of 20 cents or 25 cents per cubic foot. It is better to estimate on the basis of rentable stalls. On this basis costs, including land, have ranged from $800 to $2,000 per rentable stall. The figure will vary widely according to location and type of structure. However, the higher figure quoted seems excessive for any location, and a cost of $1,200 per rentable stall would be a fair average. If you take this as the investment per stall and expect a 10 per cent net profit, you must earn $10 per month per stall, counting on 100 per cent occupancy. Two garages with which I have been connected show, over a two-year period, an average operating cost of $9.24 per rentable stall per month. This figure of course refers to garages run as separate ventures, not in connection with office buildings. Figures for the latter do not seem available at this present writing. Gas sales, etc., and miscellaneous services, when *proper overhead and rental expenses* are charged against them, rarely, if ever, show a profit. Consequently the rental of parking space must be on a self-supporting basis. In other words, showing a return on a garage investment is a matter of renting space, as in an office building. Average occupancy is a particularly difficult figure to determine, and yet particularly important.

Promoters of office buildings usually figure on 90 per cent occupancy. In the case of a garage, space is used for various types of parking, and traffic will vary during the year. Consequently it is not practicable to use a definite vacancy figure. If one must use one, use a 60 to 70 per cent occupancy. The 90 per cent occupancy figure has been used in the past with disastrous results. It may make a garage proposition look fine financially. But in practice experience shows that the type of storage applied for by the public varies so much according to location, season of the year and even time of day, that it is not practicable to count on an *average* 90 per cent occupancy. A garage may have, at some rare moments, an occupancy figure of 125 per cent. This will be when transient cars are occupying space already paid for by regular patrons on a monthly basis. When seasonal fluctuations take both transients and regulars elsewhere, the figure will fall to 40 per cent. Forty per cent is, unfortunately, a more constantly recurrent figure than

125 per cent. In other words, you cannot count the number of stalls you expect to have in a garage, multiply it by a rate per stall, allow a set vacancy, and come anywhere near the truth.

For instance, there are dead storage and live storage; there are hourly parking and day parking; there is 24-hour parking on a daily basis and on a monthly basis. In certain locations it is possible to fill a large number of stalls twice over for a certain length of time. There may be a certain number of regular 24-hour patrons whose cars are in at nights only. Day parkers can be put in their stalls during office hours. In some cases theater parkers can also be accommodated. Again, room must always be available for transients; it is bad policy to have to turn down any volume of transient business; for one motorist tells another, and you may be in jeopardy of losing the bulk of the trade through turning down some of it. Consequently the figuring of occupancy probabilities is intricate. It must be done by classes of parkers; it must have special reference to local conditions, neighboring office buildings, theaters, stores, etc.; and it needs a good deal of experience before a satisfactory set-up can be made. The problem, moreover, has this additional complication; you may be catering only to day parking, or to day and night parking, or night parking only. And this consideration will materially affect your earnings.

STUDY DEMAND. In every case, an intensive study of local habits and trends must be made. Cars can be counted on the streets. Main arteries must be studied. Real estate and building tendencies are particularly important. And lastly, competition must be noted. Usually there is only so much business to be done in any one area. It is difficult to create new business, and impossible to attract it from a distance. In assessing the occupancy of a garage incorporated in an office building, type of prospective tenants is very important. This factor will also help in determining how much garage space to provide,—if it has been decided to provide it. There are two considerations: the car-owning propensities of the tenants themselves, and the number of car-owning visitors who are likely to wait for them.

Obviously, buildings housing large corporations with huge clerical staffs will find comparatively few cars to be parked by tenants. A medical building or a building occupied by lawyers and the like should be particularly fortunate in having a number of cars to service. Among other considerations, the number of office employes is smaller and the number of rentable feet per person is large. Similarly, medical men attract a good deal of parking by visitors; other tenants have varying numbers of car-using visitors.

SPACE REQUIREMENTS. How much garage space shall be provided in an office building? We will, for the moment, confine ourselves to a consideration of parking accommodation for tenants and their visitors only. In many cases a building can gather parking business from other buildings, and sometimes from apartment houses nearby. But that must be separately evaluated and assessed to match local conditions. It is, first of all, necessary to know how many car stalls tenants and their visitors are likely to require. It is usual to assume from 100 to 120 square feet rentable office area per person in the building. A fair figure, under average circumstances, is one car to each eight or nine persons. This works out roughly at one car per 1,000 feet of rentable area; i.e., one rentable car stall per 1,000 feet of rentable space.

In a well laid out garage, after deducting the space necessary for garage office, wash racks, lobby, services, etc., it is found that a rentable car stall occupies between 250 and 270 square feet. This figure is admittedly higher than that ordinarily given by garage engineers, but in practice it will be found to be fairly conservative if due allowances are made for non-rentable garage space. Thus, 1,000 feet of rentable office space calls, under normal conditions, for around 250 square feet of garage space,—a simple proportion of approximately four to one. These figures are offered with a great deal of hesitation. So little definite information is available as to the actual number of cars per person in various types of office buildings. At their best they will form only a very rough indication for preliminary figuring.

If it has been decided to build a garage under the same roof as an office building, and its approximate size has been worked out, the next question is, where is the garage to be located? In the basement purely? Or behind the building? Or both? This is a matter which must be decided individually for each set of circumstances. One point is all-important. The garage must have an easy, inviting drive-in; it must have a good lobby; it must be able to handle traffic with expedition; otherwise it is doomed to failure. A steep, sloping drive-in is the worst possible advertisement for a garage, especially if snow or ice is any kind of a possibility. For this reason it is impossible to keep the garage entirely to the basement; the lobby and the drive-in must occupy some space on the ground floor.

GARAGE TYPES. Next comes the question of type of interfloor travel. It is particularly true of garages that every one is a study by itself. Office buildings, however awkward the lots, can usually follow a more or less standard layout for their

entrances. Garages must inevitably vary tremendously. Not only must the entrance, the parking lobby, and the approaches to the means of vertical travel take up a good deal of room, and be awkward to fit into any given lot, but the type of vertical travel itself is subject to many variations. There are straight ramps from floor to floor; staggered floors with shorter ramps; sloping floors; sloping floors with modified ramps; spiral ramps with sloping floors; ordinary lift elevators; special elevators, where cars are moved off and on the platform by power other than that of their own engine; endless chains; turntables and possibly others which have not yet come into my ken. Generally speaking, these various methods of interfloor communication divide themselves into two groups, the ramp type and the mechanical type. Numerous garages of the latter type have been erected, and their sponsors have claimed great advantages over the ramp type. It would seem, however, that the staggered type, with short connecting ramps, is the most practical, and will remain so for some time to come. There may be a saving in floor area in favor of the mechanical type, but the most important thing in a garage is ease of entrance and exit. Here the ramp type has been found to excel.

Few things are more prejudicial to the success of a garage than delay in delivering cars to their waiting owners. In all mechanically operated garages there is a very definite limit to the number of cars that can be handled per minute. In the ramp type the limit is very much more elastic. The real test of a garage's efficiency, and to some extent the proof of the measure of its success, comes at those times when a large number of car owners are checking out at the same time, when, for instance, the theater crowd is leaving for home. Ramps enable this crisis to be handled efficiently and without undue delay.

When considering mechanical equipment it is particularly necessary to beware of the theoretical speed of handling cars. It is very rarely achieved in practice. It usually works out that the man whose car is behind another comes first for his car, and there is a delay in extracting it. Then again, it usually seems to happen that all the cars wanted at any given moment happen all to be on the same bank of machinery, with the other standing idle,—and so forth. In general it will be found that the actual time consumed in handling cars with mechanical equipment varies greatly with the *estimated* time.

It is possible that insufficient attention has in the past been paid to the creation of the proper atmosphere in garages, the atmosphere which makes for success. We, in our company, have always felt that it is necessary to state to the public by atmosphere the fact that a new spirit has entered the garage business during this latter half-decade. It is easy to go back in memory to the time when the garage business was neither over-ornamental nor over-ethical. Five or ten years ago the word garage conjured up a picture of disused sheds and barns, floors floating in grease, grimy men, decrepit cars stacked in an unwieldy welter. The mental atmosphere was little more sanitary than the physical atmosphere. One felt inevitably that one would pay for more gas than one used; that one's car was quite capable of taking a midnight jaunt unbeknownst to its innocent owner; that repairs were carried out in a way that meant more work for the repair shop within a very short time.

The change in the garage business is due to two factors; one, the entrance into the sphere by large and responsible operators; and the other, the disassociation of the messy repair shop from the parking end of the business. But sufficient traces of the old regime remain, either in fact or in memory, to make it eminently worth while to say unequivocally, by atmosphere, that one's establishment represents a new conception of the garage business.

This is, firstly, a matter for the architect. He must achieve a sense of order and spaciousness; he must adduce what daylight he can come by. He must consider the problem not as a factory or workshop problem, but more as he would approach a hospital or a hotel. What is a parking garage but a car hotel? He will be well advised to make the office a little more like a hotel office than a factory shack, and to obscure mechanical devices as much as possible. When it comes to interior decoration, pleasant color schemes more reminiscent of hospitality than of industry may properly be used, especially in the lobby. Secondly, this is a matter for the management. The objective may be obtained partly by water and brooms and paint. Dust must be anathema. You should be able to eat off the floors. The walls should look like the walls of a hospital ward. It pays. And men should be uniformed and spic and span. Services which necessarily entail messiness should be relegated to unobservable locations. I may appear to overdraw the picture, but it is difficult to overemphasize the psychological effect of such things on the public. A proper atmosphere will express not only efficiency, but courtesy as well, and honesty and a desire to serve the public.

SERVICES. There remains one more question to discuss. What services shall be offered by the garage that is primarily serving an office building? Why is a garage? Its raison d'etre is to make car owning an effortless and griefless

process for its patrons. This consideration will urge the garage operator to think further than of the sale of goods, such as oil, gas, anti-freeze, chains and other minor accessories which are in normal demand. He will have a thought for the convenience of his patrons when they leave or collect their cars. Many will prefer merely to drive to the door and leave it to the garage to see the car to its stall. People of this mind must naturally,—and as experience has shown,—will willingly pay a higher rate than those who take their cars to their stalls themselves. Beyond this there are many services which, while adding immensely to the good will of the garage, can at least be made self-supporting. Washing falls naturally under this head; a man feels better about life when his car is spic and span. But

Drummond-Medical Building and Garage.
Nobbs & Hyde, Architects

other services are, in the long run, more important, because they contribute essentially to the pleasure of car owning. Lubrication, for instance, done on a systematic basis, according to mileage, preserves a car from mechanical trouble. Lubrication can include alemiting, changing engine oil, changing transmission and back axle lubricants, and filling hub caps. Work of this type can be done for a tenant while he is busy in his office, without wasting his time. Similarly, his gas tank and radiator can be kept full, his battery serviced, and his wind screen kept clean. Beyond this, and adjustments (including tire repairs) of a minor nature, it probably is not wise to go. Minor repairs and overhauls invite grief.

In conclusion, some data about the Drummond-Medical Building and Garage, which recently opened for business, may be of interest. The history of the project is unusual. If you drive down Drummond Street, Montreal, you will readily notice a new ten-story office building, bearing the sign "Drummond-Medical Building." There are stores on the ground floor, fronting on the sidewalk. You will notice no signs of a garage, until you pass the head of the lane which runs along the south of the building. There you will discover a 32-foot approach to two wide doors giving into a garage, apparently behind the office building. When the project was conceived, the interest of its sponsors was to locate a garage on or near Drummond Street, between St. Catherine, Montreal's shopping center, and Sherbrooke, the location of Montreal's elite apartment houses, simply because there is room for a garage in that sector; and it was figured, after due consideration, to be a very profitable location.

Unfortunately, a by-law provides that no garage shall be erected in this somewhat exclusive district. It was apparently felt by the city fathers that a garage would lower the tone of the area. More precisely, the by-law provides that no garage shall front on any of the streets within this district. Here was a loophole. Why must the garage front on any of these streets? Why not have it fronting on one of the many lanes? But if so, clearly something must front on the street, to serve as a mask or screen. It was decided to put up an office building, tall, extending the whole width of the lot available, but very shallow from front to rear. Behind this, and to some extent below the rear of the office building, a five-story garage could be inserted.

And so, from a project to erect a garage, there has come the Drummond-Medical Building. Analysis of the area suggested that it is the finest location in Montreal for a successful medical man. The building is being rented only to the medical and dental professions; and only to the so-called "ethical" branches. The garage is a 400-car garage. There are 4,000 feet of rentable store space, and 40,000 feet of rentable office space. Great care has been exercised with the garage. The architects, Nobbs & Hyde, of Montreal, have succeeded in producing exactly the right atmosphere. A combination of sloping floors, staggered floors and the ramp type of construction, makes interfloor travel extremely easy. The parking lobby will hold three cars abreast, and is 120 feet long. Gasolene sales will not impede traffic around the entrance. Servicing is done in the ample light and seclusion of the top floor. The interior decoration has been carried out with reserve and good taste. The gasolene pumps and oil stands have been made an integral part of the scheme. Time will show the virtue (or perhaps the folly) of trying to make this an ideal garage from the car owner's point of view.

ELEMENTS OF MAINTENANCE COST

BY
A. G. SCHILLE, Service Manager, Seattle
CHARLES A. LEHN, Chief Engineer, Marshall Field Estate

THE increasing competition among office buildings has introduced an era of economy in their operation and maintenance. To further the economical operation and maintenance of office buildings, the National Association of Building Owners and Managers has instituted a series of Experience Reports which cover every feature of office building performance. By this interchange of experience knowledge becomes common to the members of that organization, and many of the facts ascertained should be considered by architects in the planning of such buildings.

It is inevitable that everything which is exposed to the air, moisture and varying degrees of temperature will deteriorate to some degree. This is hastened by coming into contact with human beings or being subjected to motion and mechanical work. Materials and machinery must be selected for their resistance to deterioration as well as for their beauty.

The time will come inevitably when the most successful architect will be the man with a reputation for designing office buildings that *pay*. Profit is affected greatly by the cost of operation and maintenance, which extends over the entire existence of the building. It is readily apparent that an additional few cents per day spent on the maintenance of a particular item will aggregate quite a large sum of money during the life of the structure. The distribution of cost is the basis for a proper study of the materials best adapted for economical use.

The 1928 Experience Report of the National Association of Building Owners and Managers, based on 240 buildings, gives the cost of operation per square foot of rentable area per year as:

Item	Cost, Cents	Per Cent of Total
Cleaning	20.9	29.8
Electric system	3.9	5.6
Heating and ventilating	8.8	12.6
Plumbing system	1.2	1.7
Elevators	10.6	15.0
General expense	12.8	18.3
Power	2.3	3.3
Miscellaneous	0.8	1.1
Repairs and maintenance	5.6	8.0
Decorating	3.2	4.6
Total	70.1	100.0

Of the money spent for cleaning, it is distributed, roughly:

Item	Percentage of Total Cost
Janitor work, space actually occupied by tenants	53.
Cleaning walls	8.
Refinishing and waxing floors	6.
Cleaning corridors, lavatories and entrances	22.
Washing windows	7.
Miscellaneous	4.
	100.

It is found that the parts of the building that should receive particular attention during the designing period so as to effect economy in operation and maintenance are, in general, those which can be reached by the hands or feet of the building's occupants. The exterior of the structure should have protection, up as far as persons can reach, against match scratches and pencil marking. Economical maintenance of the rest of the exterior is best secured by using those materials to which soot and dirt do not adhere.

Corridor walls are constantly soiled and disfigured by dirty hands, messenger boys' pencils, match scratches and furniture movers' trucks. The finish of corridor doors must withstand the effect of mops on the bottom rails and must be of such a nature that finger marks will not show readily. The most vulnerable parts of the inside of the office are first the walls and, second, the floors. The finish of the walls is in constant danger of wear from the backs of chairs or other furniture, and the placement of steam radiators has a direct relation to the speed with which the walls are soiled; the floors, if of soft materials, will become cigarette burned, and certain kinds of steel chair castors will soon deface any kind of floor. The darker finishing woods now coming into use show finger marks much more readily than the oak finishes that were used several years ago.

The selection of the type of windows is important because, roughly estimated, it costs 10 cents to wash a double-hung window of the ordinary size. If this cost could be cut in half, it would effect a considerable saving during the life of the building. The use of immovable ornamental iron or bronze close to and in front of glass in entrance doors, elevator enclosures and other

places is a very costly arrangement for cleaning. These parts should be hinged or be removable. In many buildings no provision whatever is made for the easy and quick cleaning of glass so placed. The extensive use of bronze work in the entrance doors entails a considerable expense in maintenance. There is, probably, an economic balance between the value of the appearance of bronze as an attraction for tenants and the cost, both initial and of maintenance. It is an item of such importance, however, that it demands careful consideration. The use of new non-corrosive types of metal and steel for store fronts and entrance doors, frames and grilles may supplant, to a large extent, the use of bronze. The metal can be cast into ornamental forms similar to bronze. The steel can be formed into the same shapes as ordinary sheet steel. The use of these materials will necessitate the development by the architect of new forms in ornamental details which are best adapted to their characteristics. The difficulty of maintaining nickel plated plumbing fixtures has led to the introduction of chromium plated fixtures, which promise to be permanent.

A more specific analysis of the cost of wall and floor maintenance is given here, provided by the chief engineer of an estate that owns and operates several large and important office buildings,—the management of which is noted for its thorough analysis of all the conditions that affect operation and maintenance. For general commercial offices, calcimining ceilings and walls is probably the most practical and inexpensive. It can be done in the smallest length of time, it does not load up the walls with innumerable coats, it does not "check," crack or peel off if properly done, and it will last from one to two years. If paint has been used, there will be ridges in the surface where alterations are made and walls are removed, but this will not occur if calcimine has been used. The idea of using one standard color is obviously good. Less material has to be carried in stock, less time is required in dealing with tenants in regard to color, and the men become more efficient in handling one color. An efficient decorating crew, properly supervised, with work laid out for them so that there is no loss of time, can calcimine, including the washing off of the old calcimine, 15 to 20 squares per eight-hour working day per man, depending upon the layout of the offices, how much furniture has to be moved, and whether there are large or small spaces, etc. Using the $1.75 per hour wage scale, one man turning out 15 squares per day, the cost, including tools and material, is $1.10 per 100 square feet; and when 20 squares are produced, the cost is $.82½ per 100 square feet. The average cost should be $.95 per square.

For offices, such as legal suites, executives' private offices, etc., the trend seems to be toward more elaborate decorating. Canvased walls with two coats of paint, a glazing coat in varied colors and a starched coat finish is the most widely used for this type of office. The cost of this class of work runs from $.12 to $.15 per square foot. In doctors', dentists' and other professional offices, where a higher degree of sanitation is desired, where liquids and other materials are used and where offices are so laid out that people come in contact with the walls, paints, enamels or lacquers are, of course, more practical. The cost of finishing with two coats of paint, stippled, with glue size and a starch coat finish is from $3 to $4 per 100 square feet, depending, as previously explained, on the conditions. This type of work should last from two to three years and can be washed and restarched two or three times. On new wall surfaces the most economical treatment is to use a sealer, such as is produced by most of the first line paint companies, followed by one coat of washable paint.

The most economical floor, from the maintenance standpoint, is covered by either linoleum, rubber tile or something similar. It is easier to clean than the bare floor, it looks cleaner, and is more sanitary. On any office floor where there is ordinary foot traffic varnish is impractical, as it does not last more than two or three months. Where a tenant wants his private office varnished around his rugs, and where the floor does not get very much wear, varnish can be used. Two coats are necessary to make it look well. The cost of this work, including scrubbing, bleaching, staining and applying two coats of varnish is from $.02½ to $.03½ per square foot.

OFFICE PARTITIONS. Changes may be included in the item of operation and maintenance. The change in tenants, which is constant to a limited degree, usually entails a change in the layout of the space. The demolition and rebuilding of masonry partitions is expensive in labor and time because of the work of the several trades involved. To avoid many of the unsatisfactory conditions accompanying the making of these changes, the movable partition was invented. Constant improvements have been made in the style and construction of such partitions so that they permit of great flexibility in making installations. They are removed and installed quickly, with limited defacement of the adjoining floors, walls and ceilings. It is customary for the managers of new office buildings to purchase a sizeable stock of movable partitions and doors for immediate use. Movable partitions are of wood and of sheet steel, finished in various colors.

OFFICE LAYOUTS FOR TENANTS

BY
WARREN D. BRUNER
PRESIDENT, BRUNER & SIMMONS, INC.

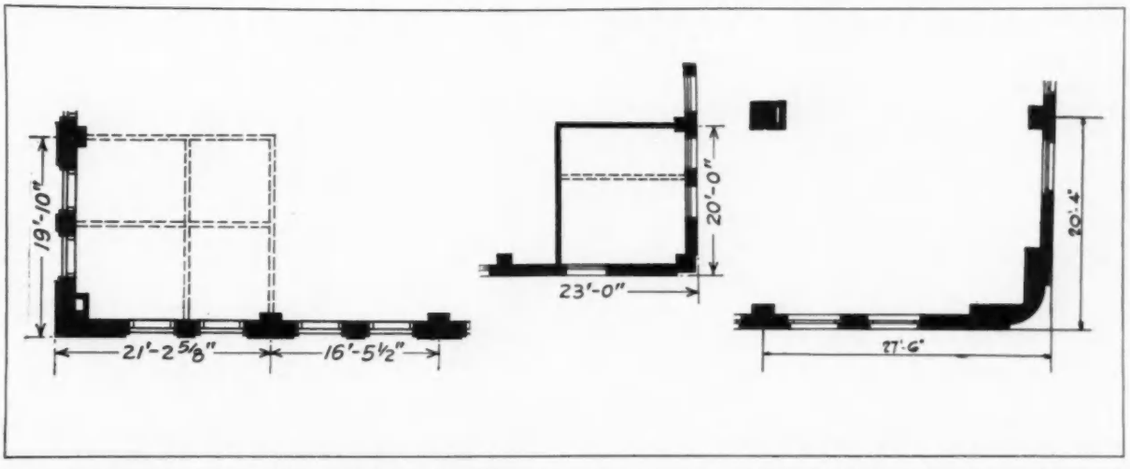
THE tenant considers four things when renting floor area. These are location, appearance of the building, building service, and suitability of the floor space for his needs. The most important factor is the suitability of the floor space for the intended purpose, because it is the effectiveness of the work done in the space that measures the prosperity of the tenant. The suitability of the space is affected largely by the architectural design of the plans and the arrangement of the windows. It is readily apparent that some architects have been concerned with the appearance of the building rather than with its usableness. The conception of office building architecture,—that the design must follow the use,—has been forced by the need for designing buildings for profit, purely an economic problem. As the tenant is the source of profit, the successful building will be that in which "consider the tenant" has been the principal objective, with consideration of course to location, appearance and service.

Some of the principal handicaps to the efficient utilization of floor area and adequate office layout are illustrated. "Architectural treatment" has demanded the use of wide piers at the corners of a building for the purpose of giving the appearance of "solidity" to the structure. This is an inhibition resulting from the pre-steel-skeleton forms of masonry construction. The result is that often the best space in a building is least effective for any purpose. In a recently designed building to be erected at 21 West Street, Manhattan, Starrett & Van Vleck, architects, have eliminated the corner pier. This is feasible from a structural consideration and it will permit of the maximum utilization of the corner space. This is probably the first commercial building in America to be so designed.

Another handicap to floor utilization is found in the spacing of the windows caused by the undue consideration given to "architectural effect." The exterior bays should be from 17 to 20 feet wide, with windows which permit the bay to be divided into 8½-, 9- or 10-foot office units, the minimum for usefulness. Partitions then can be installed with regard for appearance and relation to windows. A bad example from one of our most important and costly buildings is shown, in which the bays are 15 feet wide and do not permit good subdivision of space nor a sightly relation of partitions to windows.

Tenants of a certain kind demand a double door main entrance to their offices, which should be made possible when the plans are studied. An illustration is given which shows how the placing of the plumbing pipes on the wrong side of a column prevented the renting of very desirable space because the desired double door entrance could not be installed at the end of a corridor.

The installation of permanent office partitions, according to a "typical plan" when the building is being constructed, is still done to some extent but the demolition of existing partitions and the erection of new partitions are costly. In a recently



To produce certain exterior architectural effects with wide wall spaces at the corners of these buildings reduced the usableness of the adjacent floor space

Interior view of the all-glass corners of the new 21 West Street Building, New York. Starrett and Van Vleck, Architects

constructed office building six floors were finished according to the "typical plan," and many changes were made for the incoming tenants. The best modern practice is to leave all floors undivided except as rented.

The space is sold by a broker or renting agent, and a tentative layout of the space for the prospective tenant is a valuable assistance in closing the transaction. These tentative and final layouts are made by the architect, the renting agent, or a layout specialist. In any event, the layout must be made by an expert in order to secure the best possible utilization of the space with economical cost of construction. Some architects and renting agents employ special experts with satisfactory results.

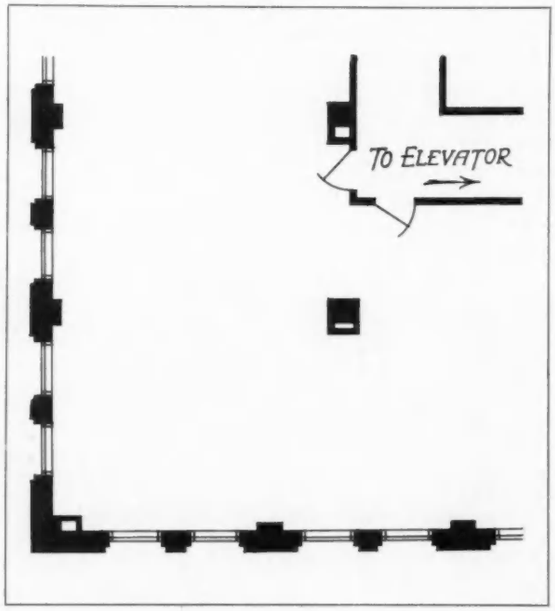
Within the past six or seven years there have developed professional organizations specializing in planning office layouts. A number of building managers consider the best solution to the problem of adequately providing for a tenant's needs lies in the employment of such an organization.

On a number of buildings projected for the future, the tenant has been represented in the drawing of the plans by the combined efforts of the owner, promoter, financier, architect, engineer, building manager and an expert in office layouts.

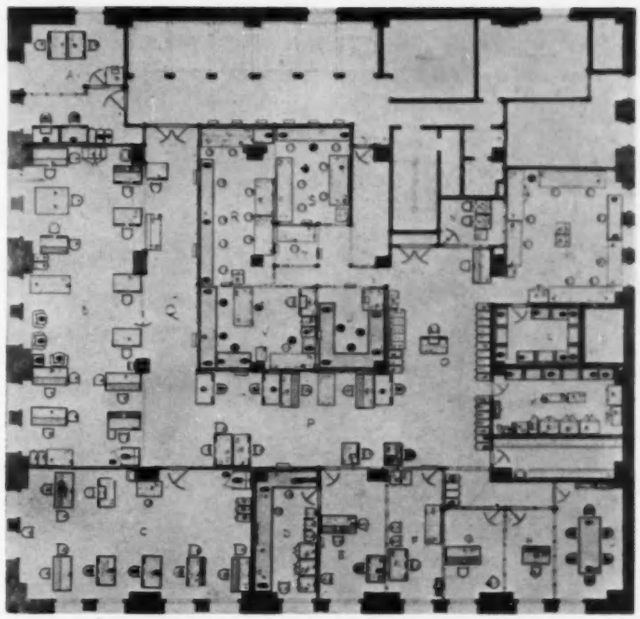
In one building the contractor was permitted to erect typical partitions on the floors not rented at the time he was ready to put up the partitions. On practically every one of these floors it was necessary to remove the partitions and change the position of corridor doors because their initial location had been made with insufficient regard to the needs of prospective tenants. In still a third building, special type, borrowed-light, movable partitions were made standard and stocked. No thought was given to the needs of tenants requiring wickets. As the building caters largely to financial houses, many wickets are required, and many special partitions have been built while large stocks of unused standard partitions are still on hand.

Making tenants' layouts before approval of the final plans for the building may seem fantastic, but this was done in a building in Chicago which is still in the preliminary plan stage. Complete detail layouts, made according to the specifications of a number of actual companies of the class sought as tenants, are being set up on the preliminary plans. To date, one change in the plan has been made, with the tests not yet concluded.

COLLECTION OF DATA. The layout expert's first task is to assemble the essential information. His procedure must be speedy, accurate and comprehensive. The greatest aid is a plan first made of the existing arrangement. This indicates the dimensions of the areas occupied by the different individuals and departments, the location and dimensions of all pieces of furniture, the names of all individuals, and the location of telephones and other communicating devices. With a blueprint of this plan on which all pieces of furniture have been given numbers, a conference is held with the executive and information secured from him regarding expansion, replacement of furniture, general contacts, decoration and other matters. From the office manager or



The prospective tenant demanded a double door main entrance to his space facing the corridor leading to the elevator lobby. The plumbing pipes wrongly placed on the near side of the column prevented this desirable arrangement

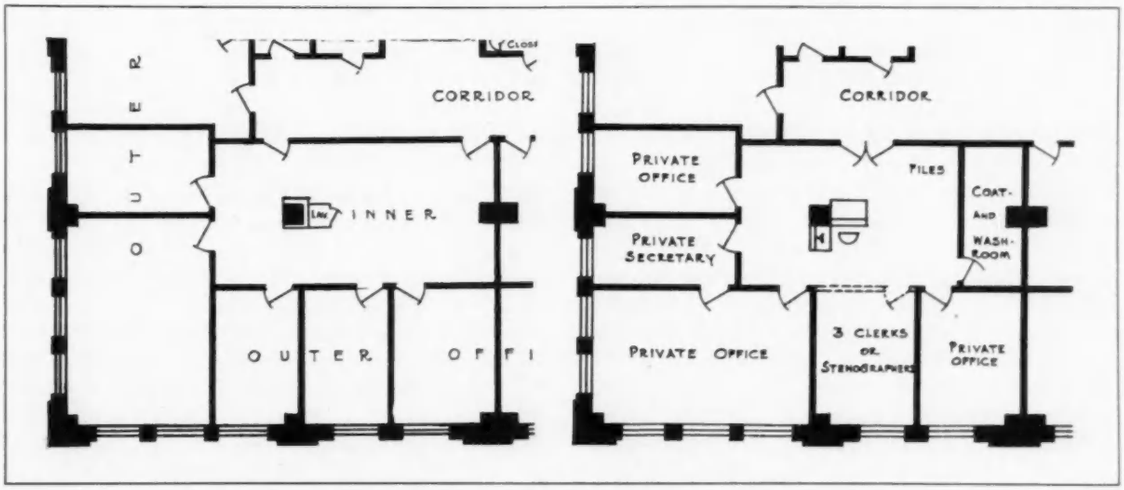


Tenant layouts are made with printed templets of furniture, all kinds of office equipment and partitions made to scale. These templets are shifted about until the plan is satisfactory, the templets tacked in place and the photostat of the templet plan becomes the working plan

from the department heads the details regarding individual contacts, new equipment needed, and other data are secured, all of which is tabulated and summarized.

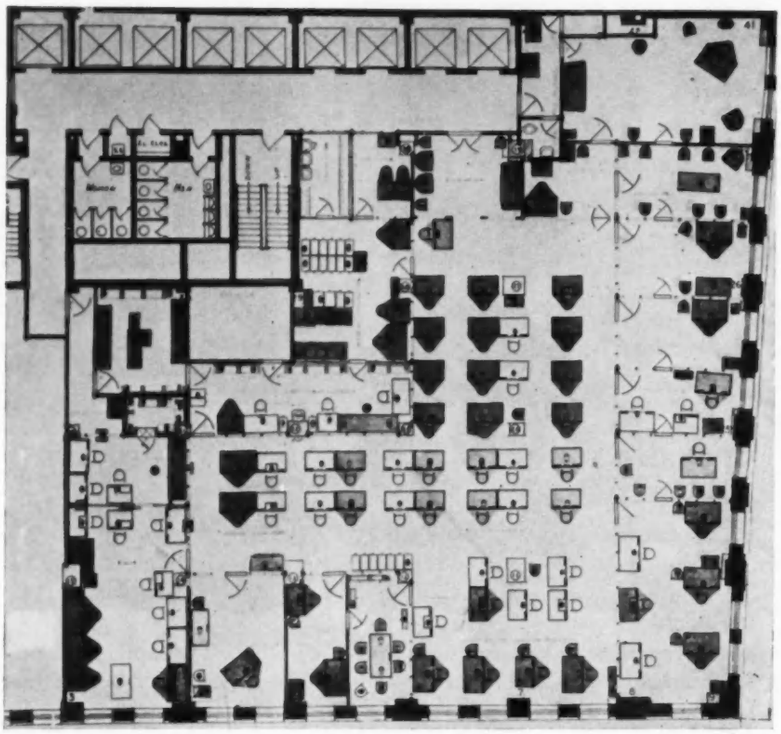
PRELIMINARY PARTITION PLANS. A number of small scale floor plans showing possible arrangements of partitions and other main features in the new quarters are next developed. It is here, and in the next step, that knowledge of the operations of the particular type of business is essential. The most likely of these plans is taken up with the client to determine which in general seems most suitable. Probably revisions of one or two of them are necessary before one plan is tentatively approved.

TEMPLET PLANS. The floor plan finally selected is set up on a layout board on a quarter-inch scale, and templets, representing partitions, door swings and other building facilities as well as furniture, shelving, counters and the like, are moved around to produce the most effective working arrangement. In this process the tentatively approved partition plan frequently becomes unrecognizable, so many changes appearing



(Left) Permanent partitions, and (Right) Final Tenant Layout. Changes required

2 single doors closed up.
2 single doors installed.
1 single door removed.
1 single door changed.
1 pair double doors installed.
2 new partitions installed.
3 old partitions demolished.
1 lavatory removed.



A tenant layout for quarters in an old building. This type of presentation shows the tenant the exact location of the personnel and the office equipment. The method of representation by templets permits the alteration of the plan with minimum expenditure of time and labor

desirable when the furniture and equipment are adjusted to give the best working arrangement. Again more conferences are held and changes made until the ultimate detail plan is decided upon. The locations of telephones, lights, buzzers, tickers and other wire systems are worked out upon the templet board or photostatic prints, and the necessary working drawings are prepared.

TREATMENT OF SPACE. With a very good general idea as to the treatment of the space desired by the client, recommendations are prepared, perhaps accompanied by sketches, photographs and samples, of the wall paneling or surface, cage and rail design, floor coverings, style of furniture, lighting fixtures and the innumerable details that go into the complete furnishing of an office.

At this point the services of the layout expert are almost invaluable. There are so many ways in which the unfamiliar buyer is led to pay too much, to get inferior material or to be misled in one way or another that it is not uncommon for the layout expert to save the tenant a considerable amount.

There are many variations from the procedure described. Occasionally a tenant takes the space as the building prepares it for him and spends little of his own money on decorative features, new furniture and otherwise.

In designing the single-purpose building, the architect can work advantageously with a planning expert. In some cases the latter is called in by, or at the suggestion of, the former to relieve him of the planning of operating arrangements and other details. In other cases the layout specialist is engaged by the client to lay out the operating plan required so that the architect will know in detail exactly what the building is to house, and he will be spared much preliminary study.

The necessity, on account of the cost of office building floor space, of securing its maximum utilization by the tenant has resulted in the development of the layout expert, by exactly the same economic processes that developed the other phases of office building specialists. It is now customary in all well considered building projects to utilize the knowledge and experience of the architect as the coördinator of elements, the realtor, engineers, contractor, financier and more recently the building manager,—all of whom are selected by the owner to best conserve his interests. The tenant, as the source of income, is entitled to the first consideration of all of the parties to the office building project.

THE ENGINEER'S PROBLEMS IN TALL BUILDINGS

BY
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UNDER the several headings of this article an attempt has been made to set forth in brief the important features that confront the engineer who is to design the mechanical and electrical installation in an exceptionally tall building. This outlines all the various problems to be met as based primarily on the result of the preliminary study, design and construction followed in the erection of the Chrysler Building, 43rd Street and Lexington Avenue, New York City, which at this writing is the tallest structure in the world.

On account of the unusually close relationship of the mechanical and electrical equipment with the structural design and planning, as well as their effect on the renting features of a prominent building, it is most essential that a mechanical engineer be retained from the outset of the project and made familiar with all of the problems and aims of the owner, builder, architect and structural engineer. Exceptionally tall buildings must of necessity be constructed on large areas of very valuable property in order to be commercially successful. It is, therefore, only sound reasoning that all of the mechanical and electrical installations should be planned from the viewpoint of ultimate economy rather than low initial cost. This ultimate economy is chiefly concerned with the many features of maintenance, accessibility, appearance, flexibility, maximum usefulness to the occupants of the building and simplicity in operation. The most favorable results can, therefore, be obtained by selecting, as soon as possible, the type and manufacture of materials and machinery to be used and thenceforth working in close co-operation with the architect, steel engineer and real estate interests for a proper arrangement and location of all of these facilities. Present day competition in renting office building space in large cities has made prospective tenants keenly aware of the additional advantages to be obtained in a building where mechanical and electrical installations have not been slighted. In fact, it is a fair statement to make that the building is no better than its mechanical equipment, as only too often a loss in the management of a large building could have been turned into profits with more practical and adequate planning and construction of mechanical equipment.

ELEVATORS

GENERAL REQUIREMENTS. Of primary and special importance is the correct determination of number and capacity and type of elevator equipment. Without discussing in detail the various empirical formulæ and other methods for determining the capacity, travel and number of elevators, it is merely the intention to emphasize at this point that the number of elevators must be ample and lean toward excessive number, rather than lack of possible future capacity. The exact size of hatchways must be determined in close relationship with the structural engineer, so that column locations will not interfere with hatchway sizes and clearances. The best type of modern skyscraper demands and requires the latest safety devices on all elevators and the maximum operating speed that can legally be obtained. All cars should be self-leveling in both directions and have electric type of power door operators to open and close both the hatchway and elevator cab doors. Signal systems must be complete in every detail to insure adequate control of all elevators from a central point in each group. No less than two cars assigned for freight and tenant servicing purposes only should be provided. One of these cars may terminate at the base of the tower portion of the building, and the other car travel to the uppermost story. Both of these service cars should also travel to the lowest story in the building. Consideration should also be given to installing supplementary shuttle elevators in the extreme top of an exceptionally tall building, but this decision must be based on an accurate knowledge of the type of occupancy of the upper portion of the building.

MACHINE ROOMS. After the elevator grouping and hatchway sizes and locations have been determined, the machinery rooms at the different levels must be planned so as to give ample interior space with as little interference as possible with other building facilities, such as stairways, corridors and toilet rooms. These machine rooms should be thoroughly soundproofed as should all portions of hatchway enclosures, which are

adjacent to rentable areas. It is also recommended that elevator machine rooms be finished with tile wainscot, painted floors, plastered walls and ceilings and that all foundations and machines be painted in decorative colors. Under no consideration should any pipe lines carrying water, drainage or steam be passed through any elevator machine room. It is also recommended that in the room containing the controllers a spare controller panel fully equipped, but not connected, be provided so as to furnish a ready replacement of any required spare parts. The ventilation, both as to the introduction of fresh air and exhaust of heated air, must be given particular study. Where motor generator sets are to be installed, it is often found to be economical to group these in large groups in the pipe floors rather than sacrifice additional machine room space at rentable area levels.

ACCESSORIES. Other elevator problems to be met, include the planning of hatchways for possible future private elevators to serve large tenants, such as banks, brokers' offices, automobile or furniture showrooms, private clubs, safe deposit companies and similar purposes. In addition, it is important that only the very best type of elevator ropes are used; that adequate size and number of directional signs are provided, locations determined in co-operation with the architect for all main floor panels required in connection with signal equipment; heavy and securely bracketed guide rail construction; type and arrangement of guide rail lubricators, mileage and trip recorders, arrangement for night service and holiday passenger elevators; a scheduling device for speeding up of cars from terminal floors; telephone system in all cabs and machine rooms and the lining of all hatchways with a suitable construction, preferably metal facias. Finally, only the best type and construction of elevator entrances should be used. This applies particularly to the cab and hatchway doors and hangers. Tight fitting hatchway doors accurately mounted in easy operating position have shown, as result of test, a considerable lessening of strong upward drafts and the ability to decrease radiation on account of better class and workmanship on elevator entrances. The use of center opening single speed solid panel doors is recommended. It is only fair to say that the popularity of an office building can be directly traced to safe, rapid and comfortable vertical transportation.

CHRYSLER BUILDING PLANT. In planning the Chrysler Building, full consideration was given to the design of the elevator plant, and it was decided that the elevator service, which would be provided for the tenants, would be the very latest and most improved type available, as this building is not equaled in height by any business structure in the world.

OPERATION. The elevators selected are of the unit multi-voltage type, having automatic signal-control operation and self-leveling equipment. The operation of these elevators is entirely automatic after the closing of the hatchway door is initiated by the elevator attendant, the following being a brief description of the cycle of operation: As each passenger enters the car at the ground floor, he announces the floor at which he wishes to alight, and the elevator attendant presses buttons in the car corresponding to all of the floors desired. When the starter's signal is given, the elevator attendant initiates the closing of the doors and the cycle is repeated at each floor for which a button has been pressed. If a prospective passenger at an intermediate floor desires to ascend and has pressed the hall button corresponding to that direction, this call will automatically be registered on the controlling equipment and the first elevator traveling in that direction will stop automatically for him, even without previous knowledge of the car attendant. On the descending trip, the car will automatically stop at each floor for which a down hall button has been pressed, also at any floor for which the operator may have pressed a car button as desired by any passenger in the car. The self-leveling feature provides exactly level landings at all floors automatically, and this level landing is maintained at all times without regard to change in load on the platform or stretch of ropes.

ELEVATOR SCHEDULE. The following schedule indicates the number, capacity and speed of the elevators installed in the Chrysler Building:

Group	No. of Elevators	Floors Inclusive	Rise Feet	Capacity Pounds	Speed FPM	Future Speed
Local	8	1st to 12th	126	2500	700	....
1st Express	8	12th to 26th	283	2500	700	800
2nd Express	6	26th to 44th	478	2500	700	900
3rd Express	6	44th to 57th	621	2500	700	1000
Tower Shuttle*	2	57th to 71st	162	2000	700	....
Service	1	Boiler to 23rd	....	3000	700	....
Service	1	Boiler to 67th	....	5000	700	....
Service	1	Sidewalk	....	.....	...	.....

* Starts from 57th floor; all other passenger elevators start from the first floor.

All of the 28 main passenger elevators have car platforms about 7 feet wide by 5 feet, 6 inches deep. All hatchway openings and cars are provided with center opening, single speed, solid panel doors arranged to provide a clear entrance 3 feet, 6 inches wide.

ELEVATOR DOORS. The doors are opened by electric power and closed by spring action, with separate oil checks for opening and closing on each pair of doors. Each elevator is provided with a single operating door engine on top

of the car, equipped with an electric motor and brake. The doors are arranged to open in about one second and to close in about one and one quarter seconds. All doors are interlocked with the self-leveling operation so that they cannot be opened until the car is close to the landing and moving toward it at the slow speed of the self-leveling control. All hatchway doors must be closed before the elevator can be started in either direction away from the landing. The solid, flush type car doors are much safer, quieter and more substantial than gates, and they have the additional advantage of removing the psychological effect of high speed on the passengers as the inside of the hatchway is not visible until the car has arrived and stopped at a landing. All doors are arranged to be manually operated in case of an emergency.

OPERATING DEVICES. The car operating devices are located on the front return panel of the car, directly adjacent to the door opening and within easy vision and reach of the elevator attendant. They are all contained in a single panel, and consist of push buttons for each floor served, operating lever, emergency stop switch, by-pass switch, emergency door operating switch, leveling speed operating switch, fan, light and remote control reversing switches. All cars are provided with illuminated, multi-light floor position indicators, located over each car door which indicate the position of the car in the hatchway by means of illuminated numerals. By means of these indicators, the passengers and attendant are informed of the location of the car in the hatchway and the floor at which it is stopping, so that the passengers may be prepared to leave the car without delay when the door is opened. All of the main elevators are provided with an inter-communicating telephone system, with instruments in each car and each penthouse, connected with master telephones at each starter's section and the engineer's office.

In the ground floor lobby of each group of elevators, a motion and position indicator is provided, by which illuminated numerals indicate to the dispatcher, the location and direction of travel of all cars in the group; and combined with this indicator is a waiting passenger indicator, which shows by illuminated numerals, the floors on which buttons have been pressed to call the cars. These numerals remain illuminated until the calls have been answered. An additional panel is located on the opposite lobby wall, which contains the necessary dispatcher's operating switches, call back buttons, and scheduling device control. This equipment gives the dispatcher complete control of all cars in the group. Scheduling devices are provided for dispatching the cars from the terminal landings at suitable intervals. Two jewels are provided in each car operating panel, one for "Up" and one for "Down," and are connected with the automatic scheduling device which signals to the operator the proper time for leaving the terminal landings. The intervals between cars are readily adjustable by the dispatcher. A novel design of triangular hall-waiting passenger lantern is provided for each hatchway door. When any car is stopping at a particular landing, the corresponding hall lantern is illuminated by a green light for the "Up" direction and a red light for the "Down" direction. The lanterns are always illuminated at a landing where a stop is to be made, regardless of whether the car is stopping in response to the pressing of either car or hall buttons. The lanterns are also provided with single stroke bells, calling the attention of the passengers to the stopping elevator, so that they may readily place themselves in front of the doors when they open, thus avoiding delay.

The building is equipped with several service elevators of the unit multi-votage, self-leveling, car switch control type. One of these elevators is arranged to travel from the boiler room to the 23rd floor, serving all floors through that zone, the other service elevator being arranged to travel from the boiler room to the 67th floor, serving all openings through its entire travel. Both of these elevators have a capacity of 3,000 pounds and operate at a speed of 700 feet per minute. The high rise service elevator is also arranged for a safe lifting capacity of 5,000 pounds. Both of the service elevators are provided with Up-Down flashlight annunciator systems connected to push buttons at each landing. In addition, the building is also equipped with one short rise freight elevator and one sidewalk elevator. All of the machines for the 30 passenger elevators, and two service elevators are of the direct drive, gearless traction type, but the machines for the short rise freight and sidewalk elevators are of the worm geared type.

STRUCTURAL STEEL

DURING the entire period of preliminary and final design of the mechanical and electrical equipment for the Chrysler Building, a very close contact was maintained with the office of the structural engineer, which resulted in considerable saving of time and a better understanding between the several offices involved. A matter that was settled first was the correct spacing and loca-

tion of all columns to provide correct arrangement and size of elevator hatchways and elevator entrances. This problem was determined on the basis that the vertical transportation in such a high building was of primary importance and that all other arrangements, both of structural design and architectural design, must be made to conform to the best possible elevator installation. An accurate schedule of location of all mechanical equipment and the weights thereof, was furnished to the structural engineer and, in addition, the detail of all vertical pipe shafts, conduit shafts and ventilating shafts. On account of the extreme height of the Chrysler Building certain groups of riser lines, adjacent to certain columns, are of sufficient weight to make necessary the consideration of this load in computing the column sizes. No mechanical or electrical plans were released for estimating purposes until they had been checked in detail against final structural plans and all necessary adjustments between these two sets of drawings completed. Particular attention was also paid to the arrangement of columns and framing to provide means of entrance and erection for a possible future boiler plant. A special study and detail drawings were also prepared for the steel smoke flue, which was erected from the sub-cellar to the top of the building. Although the possibility of a power plant ever being installed in this building was felt to be remote, it was considered the best policy to provide a metal chimney. This chiminey can be used for other purposes until the boiler plant, if any, is installed. Particular attention was paid in designing and locating the future boiler flue to provide for adequate insulation and accessibility. In no case throughout this building were any of the structural steel members pierced by pipe lines or ventilating ducts, and it was necessary to pay particular attention to proper overhead clearances.

SPECIAL SERVICE FLOORS

ON account of the increased rents obtainable in the tower portion of the Chrysler Building it was necessary to secure the maximum rentable floor area by reducing the areas used for equipment to a minimum. To accomplish this purpose, the entire 30th and 60th floors were assigned as "Service Floors." The 30th floor is at the base of the tower and the 60th floor at the base of the tapering dome. The offsets at these places necessitated very heavy steel girders which would affect the headroom in rentable areas. The introduction of these intermediate "upstairs cellars" made it possible to keep the entire portion of the rentable spaces in the tower free from equipment, with the exception of one intermediate fire pump and fire storage water tank. These two levels were used as spaces for heating distribution pipe systems, electrical transformer vaults, elevator motor generator sets and elevator hoisting machines, hot water generating equipment, exhaust fans, drinking water cooling equipment, water storage tanks for house supply, hot and cold water piping distribution systems, plumbing, drainage and vent piping, and other minor miscellaneous equipment. In addition to releasing valuable tower floor area, these intermediate service floors centralized all of the equipment and provided accessibility and easy inspection without possible disturbance to tenants, and also permitted the special sound-proofing treatment of these floors. The service elevators only stop at these floors. The chief operating engineer's office is located in the lowest level, known as the cellar. All indicating devices are placed on the walls of this room, which is centrally located so as to afford a view and be in close proximity to all sub-basement equipment spaces, such as the electric switchboard room, transformer vault, tank and pump room, fan room, refrigerating machine room, vacuum cleaning equipment room, telephone switchboard room, steam meter room, sprinkler alarm valves, etc. In this room are located wall mounted boards containing recording devices, meters, gauges and alarms for all fan motors, house and fire pumps, house and fire tanks, pneumatically operated valves on the heating system, steam pressure gauges, exterior and interior dampers, etc.

PLUMBING AND FIRE SERVICE

PRELIMINARY STUDIES. The Chrysler Building is the first skyscraper to be constructed in New York City which is equipped with a fire protection system as required under the latest revised city code. The locations of all tanks on intermediate floors for storage of water for either house supply or fire system supply were definitely located and locations also selected for all intermediate house pump and fire pump rooms. A preliminary riser diagram sketch was also prepared showing the relative location of all general toilet rooms for men and women on each floor. From a study of this diagram, several changes were made in the floor plan, which materially decreased

the cost of the plumbing work so that these general toilet rooms could be placed as nearly as possible above each other throughout the building. Also it was a simple matter to locate and size all pipe shafts and to indicate which stories should have greater floor to floor heights to accommodate horizontal piping systems. Access doors to all vertical pipe shafts were provided at frequent levels and all shafts were floored over at every floor after the pipes were in place to prevent any up drafts or hazard from fire. This feature also provides easier and safer future working conditions. Suitable suction tanks were located in the lowest basement level for both fire reserve and house supply.

WATER AND FIRE SERVICE. All tanks were hoisted into position during the erection of the steel super-structure. All fire pumps were selected in strict accordance with the new code and for the severe pressure conditions encountered. All piping on the fire standpipe system was constructed of double extra strong pipe and fittings up to the 14th floor of the building and from the 14th floor to the 30th floor of extra strong pipe and fittings.

Cold water supply for the building is pumped from the sub-basement suction tank to an intermediate house tank on the 25th floor. This tank is used as a suction tank to supply a house pump on the 23rd floor, which pumps to an intermediate house tank on the 46th floor, and this tank is used as a suction tank to supply a house pump on the 45th floor, which pumps to the uppermost combination house and fire tank on the 74th floor. These house pumps were designed so that in an emergency they could by-pass any tank which they normally supplied and pump to the tank next above. A spare house pump was also located in the sub-basement which could feed either the house storage tank on the 23rd or the 46th floor. The pump rising lines were sized so that the velocity of the flow of water would in no case be more than 3 feet per second to prevent noise from vibration. Water supply under street pressure was used for all house supply purposes up to and including the 4th floor.

Two hot water storage heaters were located in the sub-basement; one on the street pressure supply system to feed to the 4th floor and the second to supply above the 5th floor. Other hot water storage heaters were located in the pipe service floors at the 30th and 60th floors. All hot water storage heaters were equipped with remote indicating thermometers located in the chief engineer's office and with local recording thermometers. All house and fire tanks were equipped with remote water level indicating devices in the chief engineer's office. Hot and cold water risers were equipped with water pressure regulating valves, so that in no case would the water pressure on any outlet be in excess of 40 pounds per square inch.

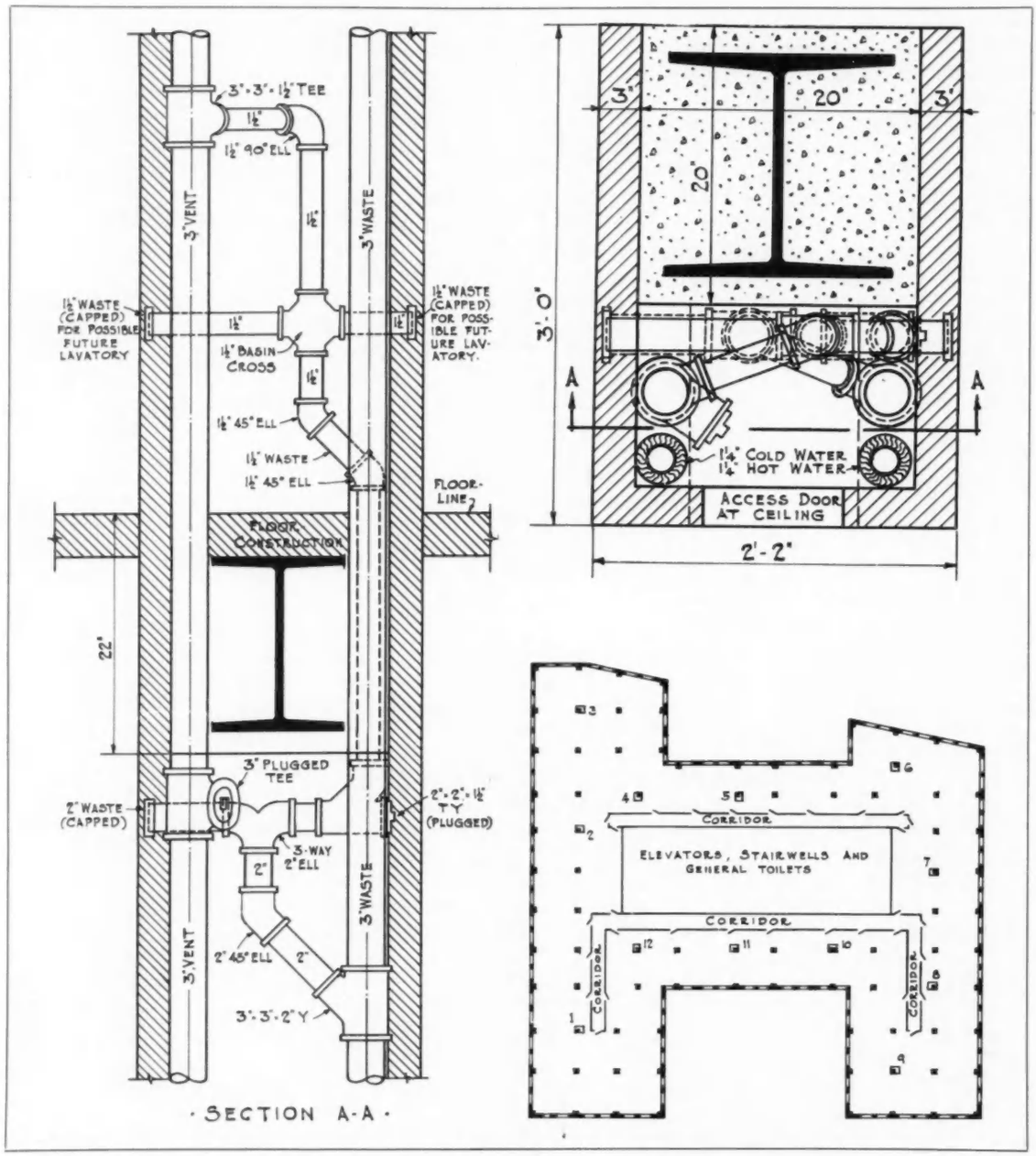
GAS SERVICE. Four 4-inch gas supply risers with plug tee outlets on every floor were installed up to the 16th floor and two 4-inch risers from the 17th floor to the 72nd floor. These risers were run in stair wells on the opposite side from the first standpipe and encased in masonry construction throughout their length.

SPRINKLER SYSTEM. An automatic wet sprinkler system was installed in the entire basement and sub-basement floors complete with central station alarm service. Additional alarm valves and additional risers were installed so that any or all portions of the 1st to 5th floors inclusive could be provided with automatic sprinkler protection in the future. Special type decorative heads are used in all public and tenant spaces.

STREET SERVICES AND BASEMENT WORK. All piping connections from the building to street service mains, such as water supply for sprinklers, fire protection and house demands, sewer connections and gas service connections were awarded as a separate contract to a point inside the foundation walls of the building, in advance of all other work. The plumbing contract started at these points. In the central portion of the sub-basement, a central vacuum cleaning apparatus was installed with a system of large mains distributed on the sub-basement ceiling, feeding risers running up through all floors of the building so as to place vacuum cleaning hose inlet couplings in an arrangement so that any portion of any floor could be reached with a maximum length of 50 feet of cleaning hose. Practically all vacuum cleaning inlet couplings are located in corridors or other locations, so that future subdivision of floor spaces to meet tenant requirements will not necessitate any change in piping. Certain intermediate columns within the rentable area of the building were selected on which to run plumbing stacks to accommodate possible future tenant fixtures.

The drainage from all fixtures on the sub-basement, basement and first floors is handled through a duplex sewage ejector, each with a capacity of 100 gallons per minute. Drainage from all fixtures above the 1st floor is handled by gravity to the street sewers. All horizontal piping in the lower levels of the building was provided with a large number of outlets for future use to accommodate tenancy, such as restaurants, clubs, barber shop, banking space and drug stores.

SERVICE PIPES. All soil, waste, drainage and vent piping on the ejector was constructed of extra heavy cast iron soil pipe and fittings. All waste, soil and drainage pipe on the gravity system was constructed of galvanized wrought iron



Detail of Plumbing Stacks for Future Tenant Fixtures and Location Plan of Stacks

pipe and galvanized cast iron drainage fittings. All vent pipe on the gravity system was constructed of copper bearing black steel pipe and galvanized cast iron drainage fittings. All piping on the vacuum cleaning system was constructed of standard weight black steel pipe and black cast iron drainage fittings. All interior leaders were constructed of black wrought iron pipe and black malleable iron fittings. All gas piping was constructed of standard weight black steel pipe with galvanized malleable iron fittings. All cold water piping 2½-inch and smaller in size was constructed of Muntz metal mixture brass pipe and cast iron pattern brass fittings. Cold water piping 3-inch in size and larger was constructed of galvanized genuine wrought iron pipe and galvanized malleable iron fittings. All hot water piping throughout the building was constructed of Muntz metal mixture brass pipe with cast iron pattern brass fittings. Fire lines were constructed of double extra strong standard weight black steel pipe with steel valves and fittings on the

lower portion and malleable iron valves and fittings on the upper portion.

The illustration shows the method of locating plumbing stacks for future tenant fixtures and the method of roughing in so as to require as little space as possible.

FIXTURES. Urinals in all men's general toilet rooms are vitreous china pedestal type with flush valves. All water closets are extended lip siphon jet bowls with black seats without lids and top inlet and flush valves. All lavatories are vitreous china, 20 by 24 inch, with pop-up waste, separate self-closing hot and cold water faucets and integral individual liquid soap dispensers. A special design was used on all flush valves and lavatory trimmings especially made for this building. All exposed brass work in connection with all fittings throughout the building is chromium plated finish.

All hose reels are set in flush mounted wall cabinets and have chromium plated valves, couplings and nozzles and the cabinets finished to match building standard woodwork. All motors used throughout are of the same type and manufacture. At intake and discharge sides of all pumps and pressure reducing valves, indicating water pressure gauges are installed. Two slop sinks per floor up to the 30th floor are provided in separate tile finished closets and one slop sink per floor above the 30th floor. The number of fixtures in general toilet rooms was computed on the basis of population of one person per 100 square feet of net rentable area and on the basis of one water closet per ten persons and on a basis of three-fifths of the population being male and two-fifths female. Temporary water supply for construction purposes was furnished by means of steel tanks at the same levels as the permanent tanks using temporary pumps and piping connecting them.

STEAM HEATING

WHEN selecting the source of steam for heating, consideration was given to the installation of an independent boiler plant and also to the use of connections to the existing high pressure steam street mains of the New York Steam Corporation. The latter method was adopted. This building is located in one of the most congested traffic centers of a large city and the owners felt that the elimination of trucks for delivering fuel would be an advantage. In addition, the elimination of a large number of employes for operating and maintaining an independent boiler plant would be an advantage. The use of central station steam supply was a considerable saving and advantage for use for temporary heating and steam supply during construction. Consequently, independent mains in two different streets one 10 inches in size and one 8 inches in size bring steam into the steam meter room, at the lowest level of the building, at 130 pounds pressure. These two mains were connected to a common header from which connections were taken through five flow meters discharging into a common header. The initial pressure of 130 pounds was reduced by stages into secondary headers carrying pressures respectively of 80, 40 and 5 pounds. All of the piping work for the street service connections and in the meter room and the various headers was of welded construction throughout, except that flange connections were used at the meter connections.

STEAM DISTRIBUTION. From the 5-pound pressure header in the steam meter room, a circuit of steam mains was run in a pipe gallery around the outside wall of the building in the lowest basement to serve up-feed connections to all radiators on the basement, first, second and third floors. This portion of the building was planned to be used principally for retail stores and display rooms, which would probably have to be heated for longer periods than office spaces and have a separate supply. A separate steam circuit was run in the same pipe gallery in the lowest basement from a connection with the low pressure header to serve up-feed connections for radiators on the 4th to 16th floors inclusive, which comprised the lowest section of the office space of the building. The return mains for each of the above systems were also installed in the pipe gallery in the lowest basement. A circuit of steam mains was also taken from a connection to the low pressure heater in steam meter room to supply the air tempering stacks in the cellar fan room, the returns from which were piped to a separate condensation pump, which in turn discharged the returns to the vacuum pumps serving the rest of the building.

From a connection with the 40-pound pressure steam header in the steam meter room, a main steam riser, 4 inches in size, was run up through the building to supply steam to the heating coils in the hot water generators at the various levels throughout the building, as well as for heating the tank room on the uppermost level of the building. A separate 10-inch main riser connection was taken from the 40-pound pressure header in the steam meter room, which runs up through the building to the 30th floor where a series of pressure reducing valves were provided to reduce

the pressure to 5 pounds, and on the low pressure side of these reducing valves, separate circuits were run in the 30th floor pipe gallery to supply respectively the north and west sides of the building and the south and east sides of the building. These steam main circuits are used to supply steam to down-feed risers supplying radiators on the 29th to 17th floors inclusive, with the returns gathered together separately on the 16th floor ceiling, passed through condensation meters and continued to the vacuum pumps in the cellar.

The 10-inch medium pressure steam riser was reduced in size to 8 inches and continued upward to the 60th floor pipe gallery space, where pressure was again reduced to 5 pounds and separate circuits run to feed the north and west sides of the building and the south and east sides of the building, above and below the 60th floor level. Steam was supplied to down-feed connections to supply the radiators on the 59th to 31st floor with the returns collected separately in the 30th floor pipe space, passed through condensation meters and thence to the vacuum pumps. Separate steam main circuits were used to supply up-feed connections to radiators from the 61st floor to the 75th floor inclusive, with the return mains in the 60th floor pipe gallery where the condensation was again metered separately and thence conducted to the vacuum pumps. All of the steam and return mains were constructed of steel pipe with welded connections throughout. All risers throughout were constructed of wrought iron pipe with screw connections, using extra heavy pipe and fittings for branches to radiator connections.

In addition to the hand-controlled gate valves on all of the several sub-divisions of the medium pressure and low pressure steam and return piping systems, pneumatic valves were also installed, which are operated from a push button control panel located in the basement chief engineer's office. Recording and indicating type thermometers were installed on all hot water generators and steam pressure gauges on high and low pressure sides of all pressure regulating valves with remote indications on a separate panelboard in the chief engineer's office.

All risers through the building were run concealed in furred spaces adjacent to columns on exterior walls. In the tower portion of the building, the risers were installed of one size larger pipe than would ordinarily be the case, as it was believed that the exposed location of these risers would cause a more rapid rate of condensation. All branches from risers to radiator connections were run concealed in horizontal wall chases in the exterior walls. All riser connections from steam mains were equipped with manually operated control valves and approximately one-half of the risers connected with pneumatically controlled valves from the chief engineer's office panel.

VACUUM PUMPS. Three vacuum pumps were installed in the cellar, to which were connected all of the return mains from the several systems. These pumps were arranged in one duplex unit and one single unit; the combined capacity of the duplex unit being two-thirds of the load. The discharge from these pumps was carried through pre-heaters serving hot water generators for the lower section of the building located in the same room with the vacuum pumps. All medium pressure and high pressure drips and returns were conducted to a separate high pressure drip tank and thence to the vacuum pumps. The discharge from the pre-heaters was then passed through a condensate mixing tank thermostatically controlled and thence to the street sewer having a temperature not in excess of 100 degrees Fahrenheit.

HEATING EQUIPMENT. With the exception of the first floor entrance lobby, copper radiators with steel enclosures, window sill outlet grilles and extended-stem direct control supply valves were used throughout the building. In the first floor entrance lobby, unit heaters discharging through ornamental grilles were used. Two of these heating and ventilating units were installed at each street entrance. The air was recirculated throughout the main lobby, which is three stories in height. All air tempering stacks over supply fans were of low pressure type. One expansion joint was installed on the main medium pressure steam riser between the basement and 30th floor and one expansion joint between the 30th floor and 60th floor, on both the main steam risers and the return risers. Suitably spaced expansion joints were also installed on all low pressure risers. All expansion joints are accessible through large access doors. It might be added at this point that throughout this building there are no open pipe shafts over one story in height, as floors have been carried through all pipe shafts to eliminate all danger of fire hazard. All control valves used on any portion of the steam piping system throughout are brass stem gate valves of 175 pound pattern on lines carrying 40 pounds and less, and 250 pound pattern on lines carrying pressures in excess of 40 pounds. The valve chart for this building has been put in the form of a pocket size pamphlet, which, in addition to giving all descriptions, locations and purpose of valves, also contains complete information on location, size and capacity of all vacuum pumps, hot water heaters, compressors, tanks, pre-heaters, fans, motors and a general description of the arrangement and control of each of the several heating systems.

In addition to the gauge board, containing the distant recording and indicating equipment in the chief engineer's office, supplementary gauge boards are also installed in the 30th and 60th floor pipe spaces for indicating the steam pressures, temperatures, etc., for the equipment located in these spaces.

HOT WATER HEATERS. Five hot water generators are used to supply hot water to the fixtures in this building; two of these heaters are located in the cellar steam meter room; one to supply hot water for all outlets up to the 3rd floor inclusive, and one to supply hot water for all outlets from the 4th to 23rd floor, inclusive. The 25th floor heater supplies from the 24th to 45th floors, inclusive; the 47th floor heater supplies the 46th to 59th floor, inclusive, and the 60th floor heater supplies the 60th to 75th floors, inclusive. The three uppermost heaters have a heating capacity of 300 gallons per hour, the low level heater in the cellar a heating capacity of 450 gallons per hour and the intermediate rise heaters in the cellar, a heating capacity of 725 gallons per hour. All heating capacities are based on the temperature rise of 140 degrees Fahrenheit with steam service at 40 pounds gauge.

METHOD OF COMPUTATIONS. In computing the sizes and distribution of radiators for this building, particular attention was given to the flue action caused by the height of the building and the numerous large elevator shafts. This served to greatly increase the size of all radiators up to the first pipe gallery level on the 30th floor, but above this level no addition was made to the size of radiators for this cause. All main corridors of all intermediate floors are heated. The tower portion of the building, above the 30th floor, is calculated for radiator size in accordance with the factors set out in the following table; the factors are based upon a heat emission of 240 B. T. U.'s per square foot of radiation per hour, with a final inside temperature of 70 degrees with an outside temperature of zero.

The two figures indicated under "Wall" refer respectively to the insulated and uninsulated sections of the exterior walls. The three percentages listed under the column headed "Wind" are respectively north, west and east. The column headed "T. D." is for through draught effect.

HEATING FACTORS—CHRYSLER BUILDING

	Wall	Glass	Exp. N.	Exp. S.	Exp. E.	Exp. W.	Flue Action	Wind	T.D.	Roof
1st floor.....	10	3	+25%	0	5	10	30%	.....	..	..
2nd to 10th floor	10	3	35	15	25	35	30	.....	..	..
11th to 16th floor	10	3	35	15	25	35	20	.....	..	..
17th to 18th floor	10/30	3	35	15	25	35	15	.....	10%	..
19th to 23rd floor	10/30	3	35	15	25	35	15	.....	10%	13
24th floor.....	10/30	3	35	15	25	35	10	.....	10%	13
25th to 26th floor	10/30	3	35	15	25	35	10	.....	10%	13
27th to 29th floor	10/30	3	35	15	25	35	..	15-10-8	..	..
31st to 54th floor	10/30	3	35	15	25	35	..	15-10-8	..	..
55th to Top floor	10/30	3	35	15	25	35	..	15-10-8	..	..

The total direct equivalent radiation load in this building is 135,500 square feet for direct radiation and an additional direct equivalent of 44,360 square feet for air tempering stacks and air heaters, making a total direct equivalent load of 179,860 square feet.

VENTILATION

FRESH AIR. The lowest level of the building is given over to a large fan room divided into two sections, namely—one for fresh air supply fans and air conditioning apparatus, and the second for exhaust fans. The main fresh air intake is of approximately 150 square feet of cross sectional area with air taken in at the third floor level at the northeast corner of the building, and carried vertically downward to a tunnel cut out of solid rock under the basement floor leading to the supply fans in the fan room. All air is passed through air pre-heaters before going through automatic filters to air pre-heaters ahead of the supply fans. Tempered filtered fresh air is supplied by two separate fans for the cellar floor, each with a respective exhaust fan. The basement floor immediately above the cellar floor is given over to retail stores, banking space, barber shop and restaurant. A separate supply and separate exhaust fan are provided for delivering fresh tempered, filtered air to the kitchen section of the restaurant. The balance of the basement floor, together with approximately one-half of the 3rd floor, is served by two air-conditioning units.

EXHAUST FANS. In the 30th floor pipe gallery, two exhaust fans are provided for exhausting all toilet rooms and slop sink closets from the cellar to the 29th floor, inclusive. In the 30th floor pipe gallery, an exhaust fan is provided for exhausting air from all the pump rooms and elevator machine rooms between the 13th and 29th floors, inclusive. Other fans in the 30th floor pipe gallery exhaust air from elevator machinery rooms from the 25th to 29th floors, inclusive; a supply fan for providing special tenant requirements on the 26th to 29th floors, inclusive; and an exhaust fan for this system. The other exhaust fans are placed in the 60th floor pipe space for handling elevator machine rooms, pump rooms, toilet room and slop sink closets above the

30th floor. In the cellar fan room, an exhaust fan is provided for the refrigerating machine room. Other exhaust fans are located on the 74th floor for exhausting air from toilet rooms, machine rooms, etc., above the 60th floor.

Kitchen space exhaust and kitchen range hood exhaust are discharged at the 74th floor into the fire tower court. Machine room, toilet room and slop sink exhaust is discharged at the 30th floor and 60th floor respectively. Each fan on any of these systems discharges in a horiozntal direction to two opposite sides of the building so that prevailing winds will not interfere with efficient exhaust. General cellar exhaust and refrigerating machine room exhaust are discharged on the large roof at the 4th floor level. Future connections and foundations have been provided on the 67th floor for air conditioning purposes to ventilate a proposed club and restaurant at this level. At this writing the preliminary tests indicate that the results are very close to the original calculations and requirements.

SOUNDPROOFING

PARTICULAR attention was given to the design and construction of all foundations and enclosures, adjacent to tenant spaces, for all fans, pumps, elevator machines and any other equipment, which would cause noise or vibration. The rear walls of all elevator hatchways adjacent to possible office space were constructed with 6-inch hollow tile blocks, on the outside wall of which were a 2-inch air space and another wall of 4-inch hollow tile blocks over which was placed a 1-inch thick layer of insulating material and then the plaster finish applied. It is impossible in any office space, adjacent to elevator shafts, to detect any noise from the passing of elevators or counter weights. All elevator machine rooms, or pump rooms, located outside of the pipe gallery floors are equipped with double entrance doors fitted tightly to the door opening at all points. In addition, the floors, walls and ceilings of these rooms are constructed as described above for the elevator hatchways to prevent any sound emanating from them. The elevator machinery itself is further mounted on heavy concrete foundations with cork mats at all bearing points. As described in the ventilating section of this article, special heavy frame foundations with cork mats were used for all fans in addition to greatly increasing the gauge of duct work at all fan connections. Intermediate floor house pumps are in rooms constructed similar to elevator machinery rooms with similar type of foundations. Vestibules are provided at the entrance to all general toilet rooms and the walls are greatly increased in thickness. All flushometers have been carefully adjusted so as to operate with a minimum of noise. Special consideration, as well as preliminary investigation and test, was made on several different types of steam pressure reducing valves with a result that the valves as installed operate without any noise whatsoever.

NON-CONDUCTING INSULATION

ALL pipe lines, tanks, ducts, machinery and equipment have been covered with the best quality of non-conducting insulating materials to reduce thermal losses to a minimum. All pipe sleeves through floor arches are filled for the entire depth with asbestos fibre loosely rammed. Extra heavy built-up covering has been used on all pipe lines exposed to outdoor temperatures, or pipe passing through heating and fresh air chambers. Special types of built-up covering have been applied on all pipes in tunnels, trenches or partially excavated spaces. Cold water supply piping and hot water circulating pipe throughout the entire building, except branches run in floor fill, are covered with sectional pipe covering. All pipe, fittings and flanges of the ice water drinking system are insulated. Fire standpipes are covered as required by the city code. Wherever cold water piping is adjacent to steam piping, it has been covered with built-up covering same as piping exposed to outdoor temperatures. All horizontal runs of soil, waste, drainage and leader piping located in pipe galleries or concealed in furred ceilings, have been covered and finished with a canvas jacket. All tanks have been insulated on the top and all sides, except the bottom.

The entire height of the steel boiler chimney flue; the main fresh air intake tunnel in contact with heated rooms; air re-circulating ducts from lobby unit heaters; connections from air intake tunnels and supply blowers and heater casings; all ducts and branches carrying tempered air; exhaust air ducts, carrying high temperature air, such as kitchen exhaust and elevator machine room exhausts; all supply ducts in contact with outside walls of the building or in contact with the main fresh air intake tunnel; duct work in connection with the air conditioning system, including dehumidifiers, fan connections and casings; high pressure steam piping and all flanges

on high pressure and reduced high pressure piping; all low pressure steam piping and all low pressure steam risers and radiator branches are insulated. A double thickness of covering is used where any steam or return piping passes through unusually cold temperatures.

ELECTRICAL WORK

DISTRIBUTION. In adopting the alternating current feeder network system for the Chrysler Building, 120-208 volts, a radical departure was made from existing practice in greater New York City. Three phase feeders carrying the current at 13,800 volts were brought into the building and extended vertically to four transformer banks located at different floor levels. The secondary conductors from these transformer banks were brought to low tension network switches and thence to the associated distributing main light and power switchboards.

This method resulted in the building load being divided into four parts as follows:

Location of Transfer Bank	No. and Size of Each Bank	No. of Net-Work Switches	Supplies Current for Light and Power to Floors
Basement	5-300 K.W.	6	Cellar to 14th floor
30th floor	5-300 K.W.	6	15th to 46th floor
60th floor	4-300 K.W.	5	47th floor to roof
72nd floor	4-150 K.W.	4	Floodlighting

Aside from the continuity of service, the greatest benefit is in the reduction of the lengths of power and lighting feeders required, thus cutting down the voltage drop and decreasing the cross sectional area. Instead of extending feeders from the cellar to the upper floors which, after allowing for slack, horizontal runs, etc., may total 1500 feet or more, it has been possible to keep them down to a maximum length of 350 feet and an average length of 200 feet. This system of employing high tension feeders and transformer banks located inside the building itself, was a pioneer installation in the eastern states.

Another factor generally not given the importance it deserves is that the voltage drop along a lighting feeder up to the point where tenant sub-metering begins, represents a loss of energy which is recorded as part of the total electric current bill paid by the owner and no part of which he recovers from any tenant. It can be shown that the increased cost of keeping down voltage drop by liberal sizing of feeders amortizes itself almost within the same period of time that the building project does as a whole. In addition, there is the advantage of a steady and uniform voltage free from sudden dips and peaks, evident where alternating current is concerned.

In designing the light and power feeders it was decided to give full and careful consideration to all pertinent and associated factors, such as "skin effect" in the larger sizes of conductors, power factor of the power consuming equipment and devices and to provide a flexible and yet economical grouping of feeders and, most important, secure the proper limiting of voltage drop. In calculating the voltage drop of the different lighting feeders, radical departures were made from the conventionally accepted practice. The objective was to obtain 115 volts, or a voltage as near to that figure as possible, at or close to the ends of the branch lighting circuits. The voltage at the various distributing switchboards throughout the building is maintained at 208 between phases, which corresponds to 120 volts between neutral and any live phase. This then meant that 5 volts between neutral and any live phase or 8.65 volts between the three live phases were to be the maximum permissible voltage drops.

The best copper arrangement was found to be that scheme wherein a drop of 2 per cent, or 4.15 volts across phases, was allowed in the feeders and a drop of 2.6 volts between the neutral and any live phase on the average lengths of branch circuits. A value of 4.15 volts across phases is equivalent to 2.4 volts between phase and neutral; the sum of 2.4 and 2.6 is 5, the total drop desired.

FEEDERS. The 1928 National Electric Code recommended method for calculating feeder sizes for office buildings gave the basic unit as 2 watts per square foot of gross area for the first 10,000 square feet and of 0.7 of 2 watts, or 1.4 watts per square foot, for the remaining area. The Electrical Code of the City of New York required that all feeders be sized on the basis of 6 amperes for every active and spare circuit on all the panelboards supplied by them.

Overshadowing was the question of what is the actual load on a feeder after the building was in service, and what adjustments would be necessary to first adequately supply the tenant with current at proper voltages free from objectionable flickering and satisfying the city code.

It was decided to calculate the size of each lighting feeder by three methods; 1st, the actual possible connected load, 2nd, the New York City Electrical Code requirements, and 3rd, the recommendations of the latest National Electrical Code. The last results were only of academic interest; in almost all cases the sizes of conductors obtained were entirely too small and were not employed.

We get for method No. 1 a cross sectional area of 345,600 C. M., method No. 2, 235,200 C. M. and method No. 3, 162,000 C. M. After making back checks on the actual voltage drops

produced by both a 300,000 and a 350,000 C. M. cable, the size selected was the latter. This permitted of the easy installation of four such conductors in a 3½-inch conduit, kept down the skin effect and reactance to reasonable values, fully complied with the New York City Code, and permitted the use of a 400 ampere switch and 300 ampere fuses on the local switchboard. This last benefit is of the greatest value. It provides a certain amount of excess capacity for the future.

Should a feeder as calculated require more than 600,000 C. M. in cross sectional area it was divided into two sets of conductors, connected in multiple at each end. The question of adequate feeder sizes is becoming increasingly important. Competitive office buildings have resulted in a dangerous decrease in the cross sectional areas of conductors and consequent poor illumination with the certainty that in a few years additions would have to be made to the feeder system.

The employment of a load factor on feeder sizes is a dangerous thing. One need but observe representative office buildings and note how many entire floors are fully illuminated at the same time, particularly in the winter months, to realize that load factors are close to 100 per cent for a good deal of the time.

ILLUMINATION. Much study of the problem of general illumination has shown that for ordinary general lighting purposes, one outlet for every 100 square feet is most satisfactory. This gives a uniform spacing of ceiling outlets on 10-foot centers. For convenience outlets it is customary to locate two receptacles mounted on opposite faces, on each interior column and one on all exterior columns. In some cases fan outlets mounted 6 or 7 feet above the floors are also placed in two sides of each column.

UNDERFLOOR SYSTEM. Floor outlets are necessary in modern offices, and underfloor raceways both for lighting and telephone purposes are universal practice. In the Chrysler Building, two independent grid systems were installed in the floor fill of each rentable floor, providing telephone, low tension, or lighting outlets at almost any desired point.

The bay of 400 square feet is used as the working unit in considering the circuiting of the outlets. While the National Electrical Code and most city codes allow twelve outlets to a circuit, experience has shown that the best practice is to place ceiling outlets on a separate circuit from convenience outlets because of the possible blowing of fuses due to trouble in portable devices and also because of the annoying flicker in the lights due to the starting and stopping of many appliances. Therefore, with the bay our unit and four ceiling outlets per bay, one circuit would normally be allotted to them and another to the side wall and column receptacles. In the Chrysler Building it was decided to provide another circuit for the high tension floor outlets which the bay ultimately might have. Thus, there are three circuits to each 20-foot bay, and one home run conduit also provided.

Tie conduits were placed between bays so that if inter-connection of the circuits of two or more bays is desired, a raceway is available. Since the underfloor circuits feed down from the ceiling junction box by way of column receptacles to the nearest under-floor junction box, and the underfloor system is also tied into panel boxes by means of 1-inch conduits, we have a grid system in floor and ceiling which makes it possible to devote existing circuits not needed in one part of the floor to an unforeseen demand in another area. It was also considered desirable for metering purposes to place all of the corridor and utility space lighting on a separate main feeder. By means of empty tie conduits, the entire core of the building is encircled by a raceway, making it possible for any public lighting circuit to be carried to any of the three panelboards on a floor.

SEPARATE CIRCUITS. In order to give the maximum flexibility we have provided a considerably greater number of separate circuits than the number of outlets require. After numerous cross checks, we arrived at two and one-half circuits per bay as the proper number of panelboard circuits to be provided. This ratio gave us enough branch circuits for the actual circuits in use plus at least 10 per cent spares for future requirements. This does not include the provision for public lighting circuits. We found in satisfying the requirements of the city code voltage drop and standard cable sizes that we could provide the building with nearly 4 watts per square foot, or about twice what we concluded one individual in his 100 foot area could use.

SPARE CONDUITS. In the Chrysler Building, spare conduits were installed in each of three electrical shafts and carried to their respective main switchboards in cellar, 30th and 60th floors. There is space available in one of the shafts to install still more conduits between top and bottom of the building and by means of conduit ties there is a way provided for augmenting service at all distribution points in the building.

SPECIAL DETAILS. Special details of construction were adopted enclosing high tension feeders running up through the core of the building and also for the location and construction of the transformer vaults within the building.

No water, drainage or steam piping was permitted to be run in proximity to any electrical devices. Duplicate feeders are provided for the operation of all of the several groups of elevator machines.

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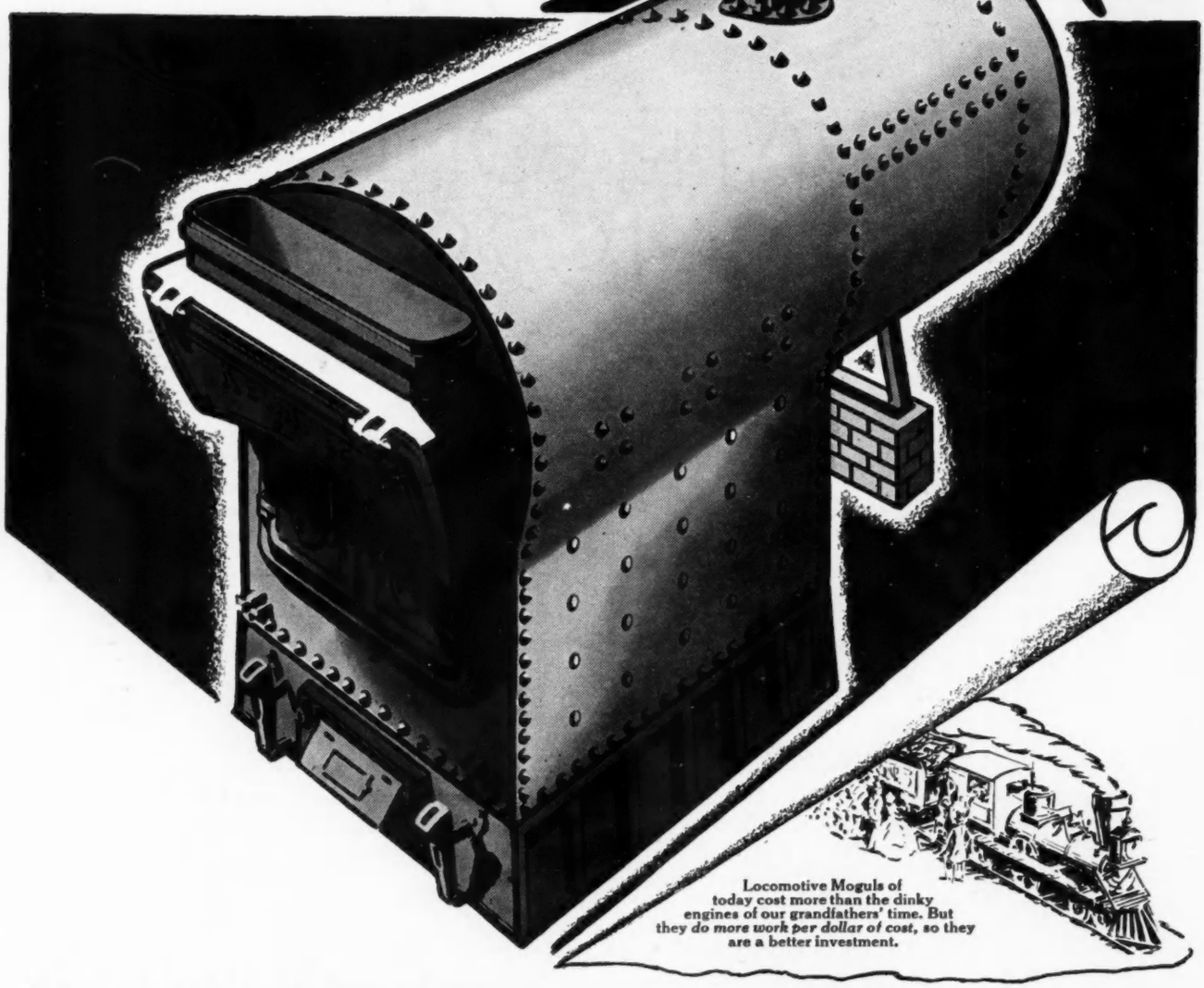

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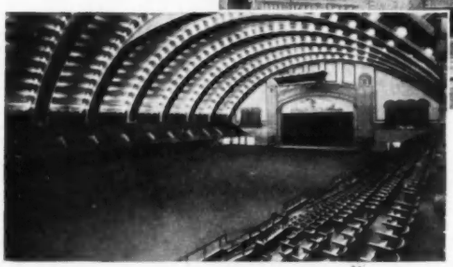
Plants at Chicago, St. Louis, Birmingham, Milwaukee, Kearny, N. J., Youngstown, O. Utica, N. Y., Providence, R. I., and Follansbee, W. Va.

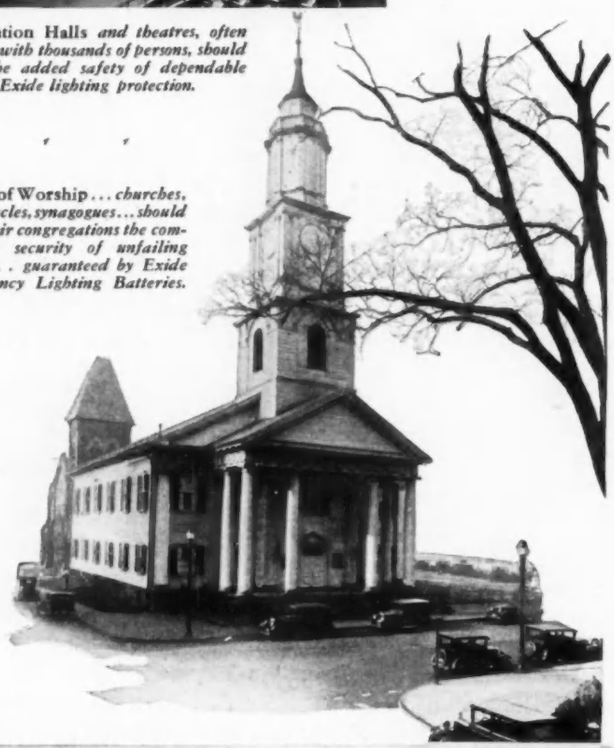
Should Public Buildings



High Schools *should be guarded against sudden darkness. Gymnasiums, auditoriums, and corridor lights need protection.*

Convention Halls *and theatres, often packed with thousands of persons, should have the added safety of dependable Exide lighting protection.*

Places of Worship . . . *churches, tabernacles, synagogues . . . should give their congregations the comfortable security of unfailing light . . . guaranteed by Exide Emergency Lighting Batteries.*



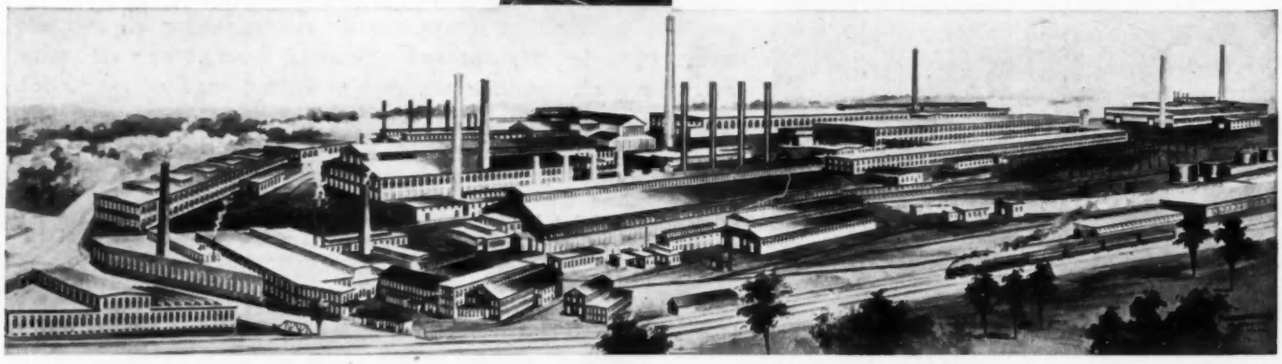
MANY public buildings have *useless* exit lights. For if electric current suddenly fails, exit lights, unless protected, also fail. Surely, then, unprotected exit lights are useless.

There are many vital locations in modern buildings, in addition to the exits, that should be guarded against power interruptions. Operating rooms in hospitals . . . vaults in banks . . . auditoriums and projection rooms in theatres . . . lights in stores . . . special operations in factories . . . and many others.

That's why so many architects all over the country specify Exide Emergency Lighting Batteries to guard against unexpected current failure. Should power suddenly be cut off, lights will continue to burn, because Exides will take over the entire emergency load . . . *instantly and automatically* . . . without a hand touching a switch.

Exide Emergency Lighting Batteries can be fitted into any budget. Their cost is moderate—depending entirely upon how extensive is the protection provided. Exides are also economical to operate. The devices necessary to control these reliable batteries and keep them in a fully charged condition are simple. No addition to the normal personnel is needed to attend them.

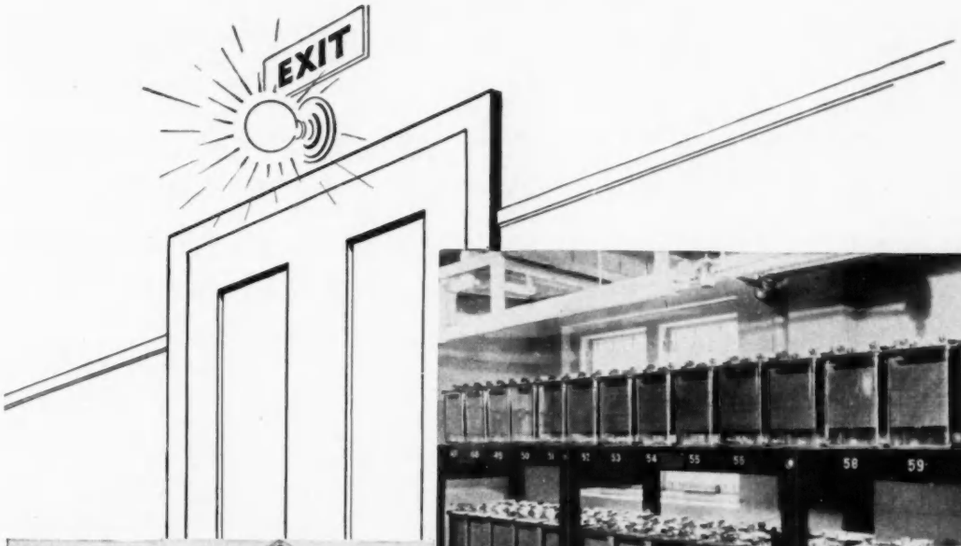
Write for one of our engineering representatives to call and discuss emergency lighting with you. Absolutely no obligation. Or if you wish, we will send you our Emergency Lighting Bulletin. A note will bring it. Write today.

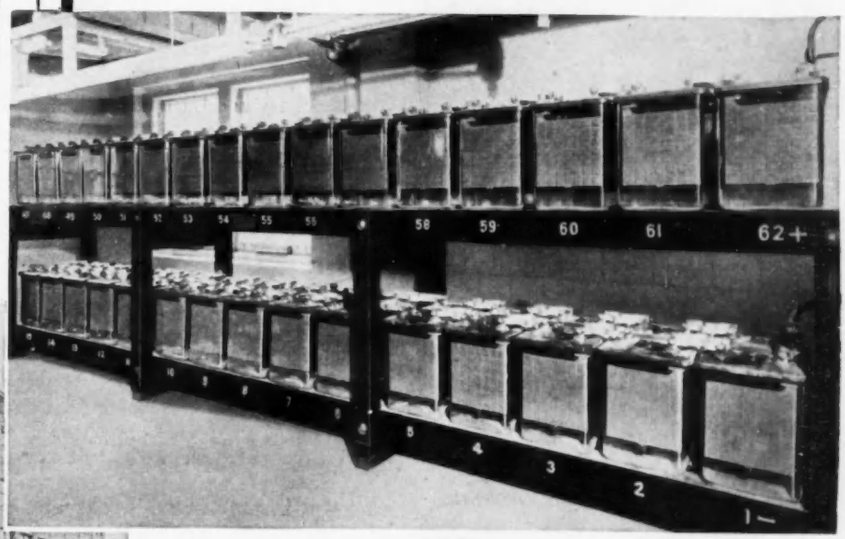


Industrial plants *the country over protect special operations against material spoilage from sudden power failure, with Exides.*

THE WORLD'S LARGEST MANUFACTURERS OF STORAGE BATTERIES FOR EVERY PURPOSE

have USELESS EXIT LIGHTS?





Here is a typical Exide *Emergency Lighting Battery. Note how clean and compact it is . . . how little cellar space it requires . . . how accessible for attention, although little attention is needed.*

Department Stores, *banks, hotels, all should protect their patrons against unexpected current failure and its possible results. Exide Emergency Lighting Batteries can do this job economically and absolutely dependably.*

This Hospital *protects its patients and staff with Exides. Small or large hospitals should guard against sudden darkness in operating rooms, delivery rooms, X-ray rooms, wards, etc.*

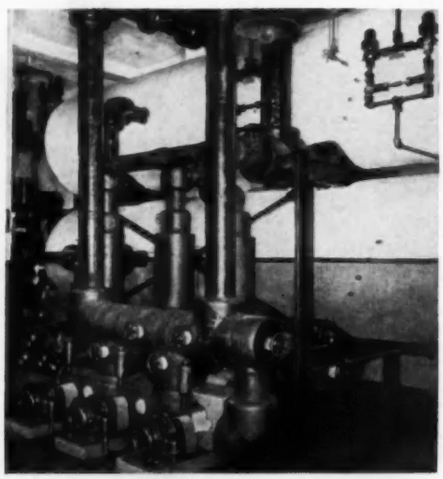
Exide

EMERGENCY LIGHTING BATTERIES

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia

Exide Batteries of Canada, Limited, Toronto

A MESSAGE TO ALL USERS OF REFRIGERATION IN INDUSTRY



ADVANTAGES of the York Patented Ammonia Circulating System

LOWER OPERATING COSTS: Higher operating suction pressures with attendant increase in operating efficiency and decrease in power consumption.

LOWER TEMPERATURES: Produces lower temperatures with minimum evaporating surface.

EASE OF OPERATION: Evaporating system may be cut out of service by merely stopping the ammonia recirculating pump. It is unnecessary for the operator to adjust valves to regulate the flow of liquid ammonia through the evaporator.

SAFETY: Assures dry gas to the compressor, thereby eliminating compressor troubles and increasing the life of the equipment.

FLEXIBILITY: Its refrigerating effect is immediate. Entire charge of liquid ammonia is carried in the low pressure receiver, precooled to evaporating temperatures, available for instant use.

EASILY DEFROSTED: Especially adapted to low temperature work. The evaporating system may be drained of liquid ammonia and hot gas introduced to the coils. Defrosting is positive and rapid.

THE refrigerating effect of ammonia liquid is much greater than ammonia gas. To be efficient, therefore, an evaporating system must operate with its entire surface covered with liquid ammonia.

Although this principle is well known, its use in the refrigerating field has been limited because of numerous difficulties encountered in commercial application. The York Patented Ammonia Liquid Circulating System (Patent No. 1718312) successfully overcomes these difficulties and utilizes the refrigerating effect of liquid ammonia to a degree never before attained. This system has shown such marked gains in efficiency and economy of operation in many industrial processes, that the savings effected have quickly paid for the entire cost of the equipment necessary for its application.

The York Patented Ammonia Liquid Circulating System incorporates in its design the York Ammonia Float Control, the York Low Pressure Receiver and the York Liquid Circulating Pump.

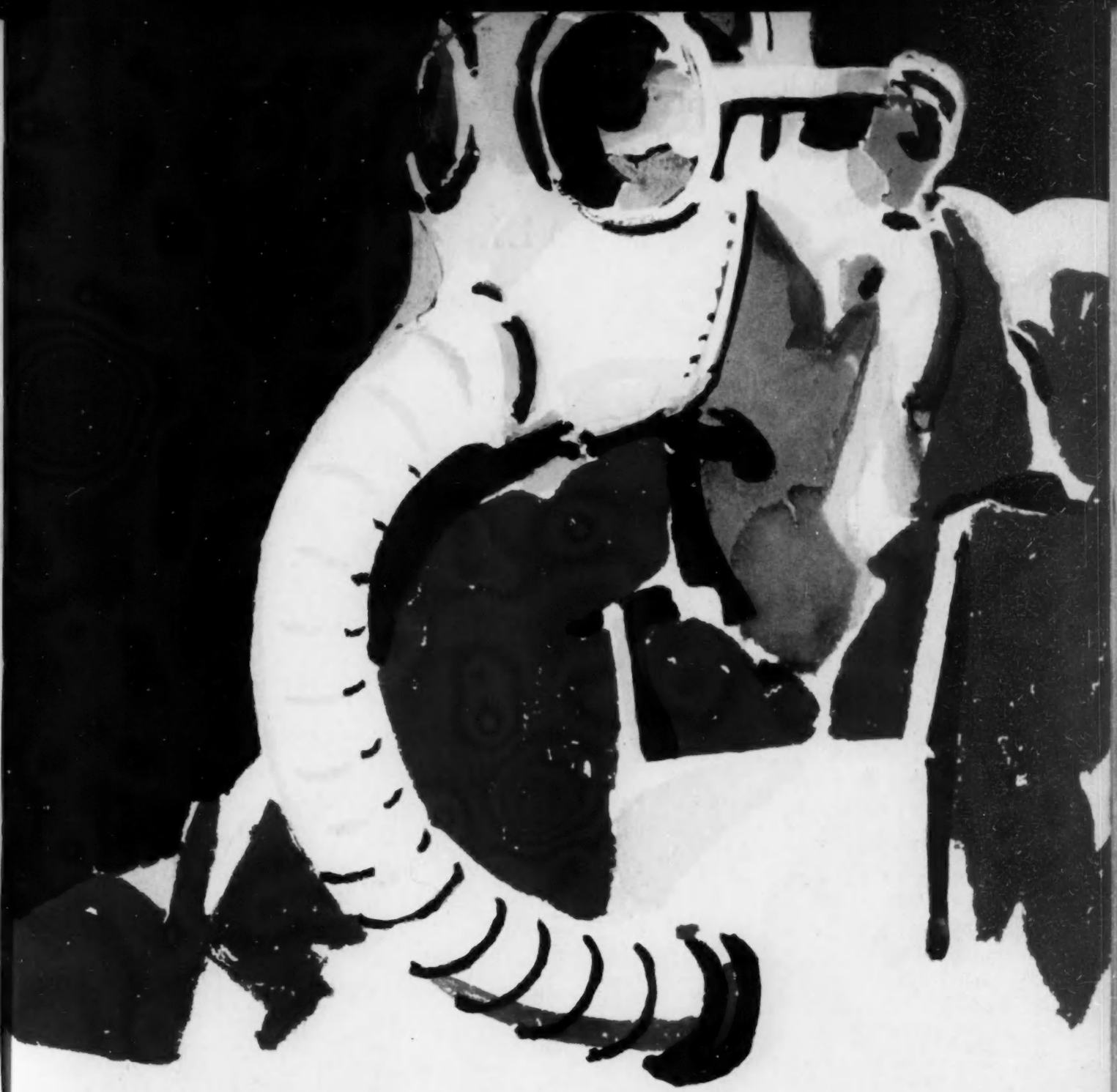
In operation a constant level of liquid ammonia is maintained in the low pressure receiver by means of the float control, regardless of fluctuations in load. The liquid circulating pump circulates liquid ammonia from the low pressure receiver through the evaporator, the ammonia gas and unevaporated liquid returning to the receiver. The ammonia gas passes on to the compressor and the unevaporated liquid recirculates through the evaporator.

Consult our nearest direct factory branch regarding the application of this system to your particular requirements.

YORK

ICE MACHINERY CORPORATION

GENERAL OFFICES: » » YORK, PENNSYLVANIA



Need a gas mask ?

Never!

BECAUSE ➡

Inspecting or cleaning a sewage pump need no longer be a "gas mask job"

INSTALL A *Jennings*

which is located above the pit where it is easy to get at

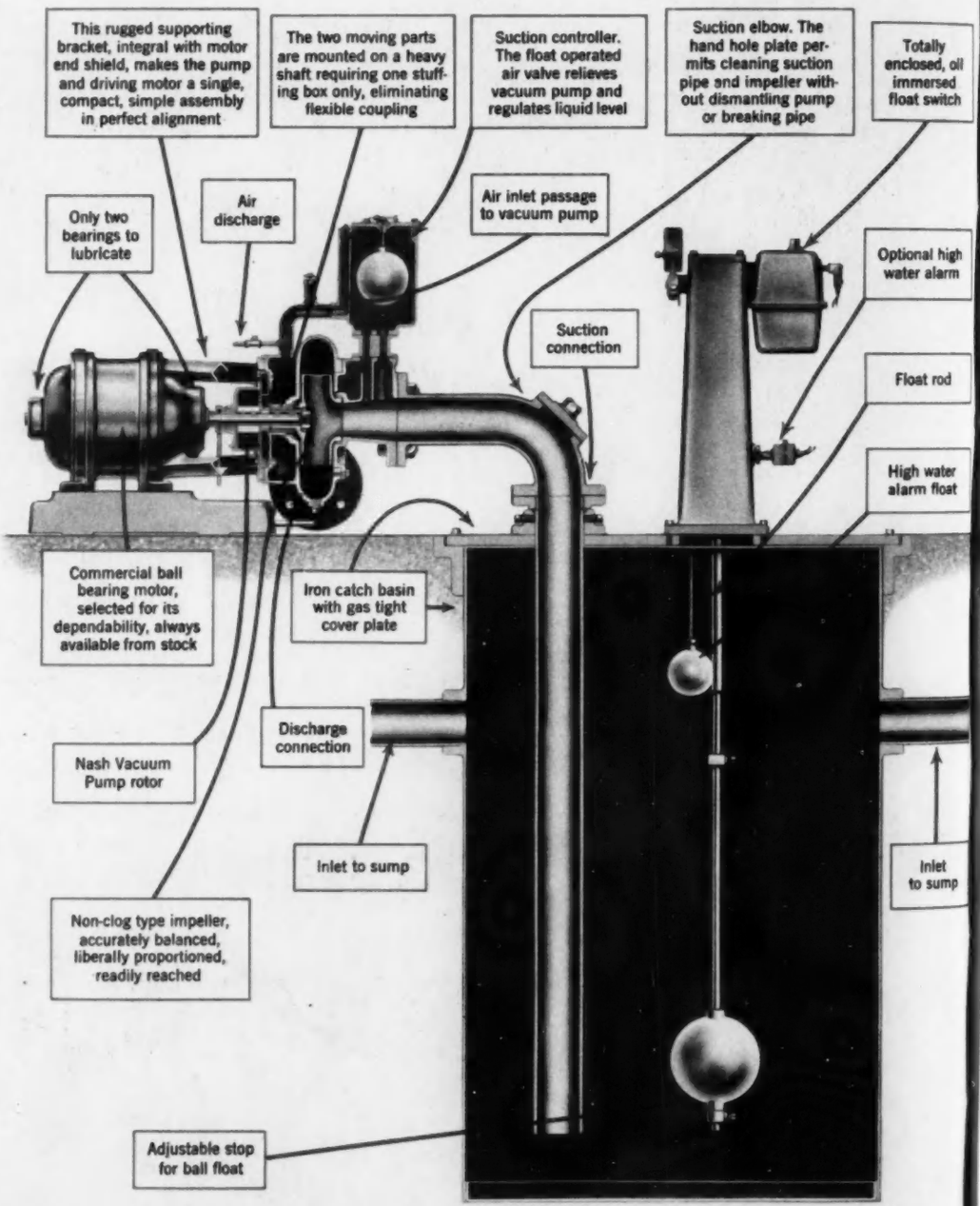
HERE is a sewage pump that is easy to take care of. Installed entirely out of the pit, the pump, driving motor and controls always are accessible.

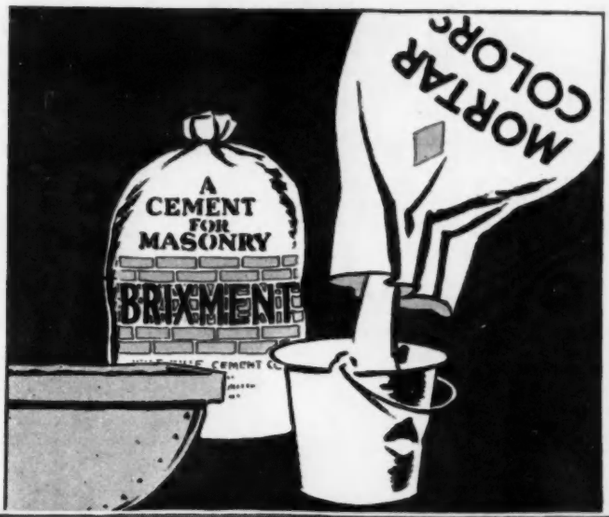
Nothing is submerged except the suction pipe. The interior of the pump can be laid open, and the impeller removed for inspection and cleaning, without even going near the pit.

Jennings Suction Sewage Pumps are furnished in eleven sizes with capacities from 45 to 450 g.p.m. of unscreened sewage. Heads up to 75 ft. Write for Bulletins 113 and 124.

NASH ENGINEERING COMPANY
33 Wilson Rd., SOUTH NORWALK, CONN.

Jennings
SUCTION
SEWAGE
Pumps


This rugged supporting bracket, integral with motor end shield, makes the pump and driving motor a single, compact, simple assembly in perfect alignment
The two moving parts are mounted on a heavy shaft requiring one stuffing box only, eliminating flexible coupling
Suction controller. The float operated air valve relieves vacuum pump and regulates liquid level
Suction elbow. The hand hole plate permits cleaning suction pipe and impeller without dismantling pump or breaking pipe
Totally enclosed, oil immersed float switch
Only two bearings to lubricate
Air discharge
Air inlet passage to vacuum pump
Optional high water alarm
Suction connection
Float rod
High water alarm float
Commercial ball bearing motor, selected for its dependability, always available from stock
Iron catch basin with gas tight cover plate
Discharge connection
Nash Vacuum Pump rotor
Inlet to sump
Inlet to sump
Non-clog type impeller, accurately balanced, liberally proportioned, readily reached
Adjustable stop for ball float



PREVENT FADING OF MORTAR COLORS

FADING of mortar colors is usually caused by the presence of strong acids or alkalies in the mortar itself.

Brixment mortar never causes fading because it contains none of these injurious chemicals.

An added protection is the water-repellent quality of Brixment which prevents moisture from penetrating the joint and leaching out the pigment.

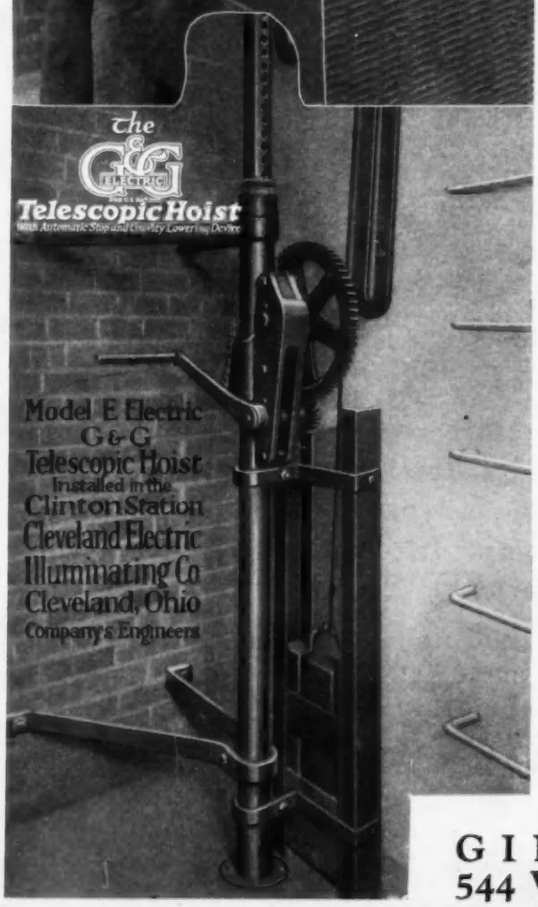
Brixment is therefore recommended and endorsed by leading color manufacturers themselves. Louisville Cement Company, Incorporated, Louisville, Kentucky.

CEMENT MANUFACTURERS SINCE 1830

BRIXMENT

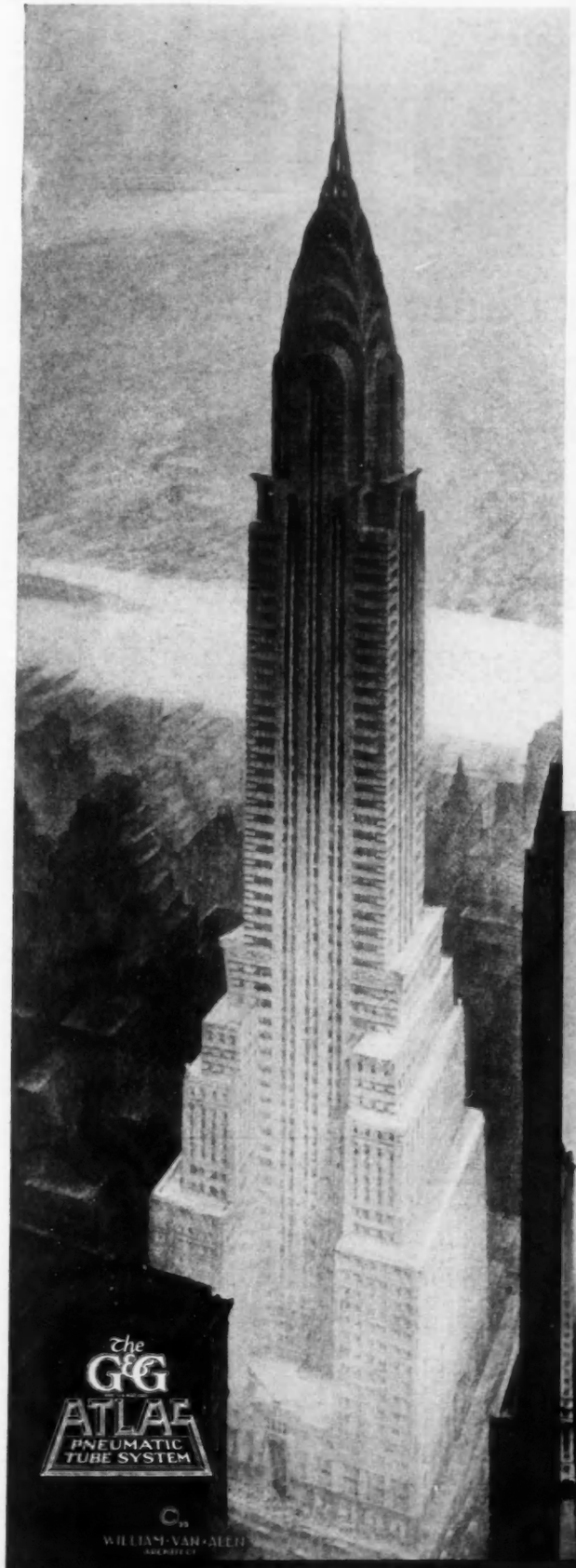
ASH REMOVAL

IN OFFICE and Commercial Buildings



Catalog in Sweet's, 1930 Edition, Pages D5116-5123

GILLIS & GEOGHEGAN
544 West Broadway New York, N. Y.



G&G ATLAS PNEUMATIC TUBES

IN THE WORLD'S TALLEST BUILDINGS

For the Texas Company in the new Chrysler Building, New York; for the Bank of The Manhattan Trust Company in The Manhattan Company Building at 40 Wall Street, New York, (these buildings to be the tallest in the world); and for the new Head Office Building of the Canadian Bank of Commerce, Toronto, Canada, (the tallest building in the British Empire) ... G&G Atlas Pneumatic Tubes will be installed and provide 30 feet per second Mechanical Messenger Service to speed handling of mail, telegrams and documents among scattered departments. For... Mechanical Messengers are faster and more dependable than human messengers . . . Drawing of typical bank installation and table of space requirements upon request.

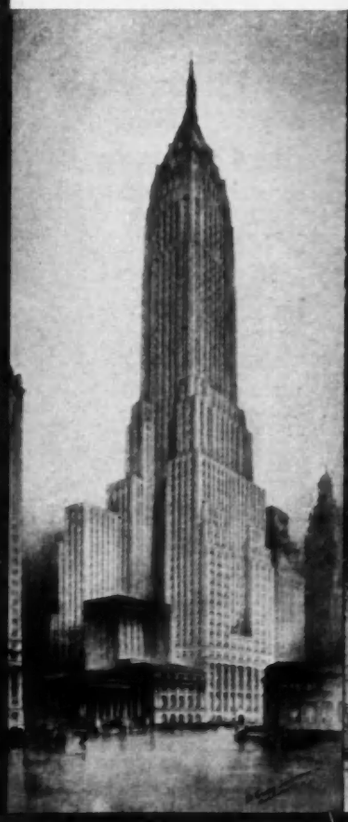
Catalog in Sweet's Archt. Cat. 24th Ed. pp. D 5113-15
Catalog in Specification Data 1930 Ed. pp. 232-233

G&G ATLAS SYSTEMS, INC.

544 West Broadway **New York City**
407 Dominion Bank Bldg., Toronto

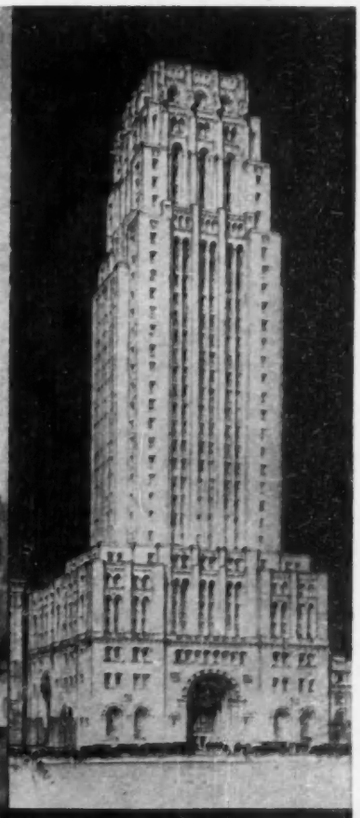
Among other G&G Atlas Installations are:

NAME	ADDRESS	ARCHITECT
BANK OF MONTREAL	Head Office	McKim, Mead & White, Architects
MITSUI & COMPANY	Tokio, Japan	Trowbridge & Livingston,
NATIONAL CITY BANK OF N. Y.	New York	None
CHASE NATIONAL BANK	New York	Graham, Anderson, Probst & White
EQUITABLE TRUST CO.	New York	Trowbridge & Livingston (E. F. Abell, Equipt. Spec.)
N. Y. STOCK EXCHANGE	New York	None
FOREMAN STATE NATIONAL BANK	Chicago, Ill.	Graham, Anderson, Probst & White
NORTHWESTERN NATIONAL BANK	Minneapolis	Graham, Anderson, Probst & White
FIDELITY PHILADELPHIA TRUST CO.	Philadelphia	Simon & Simon
UNION TRUST COMPANY	Cleveland	Graham, Anderson, Probst & White



THE CHRYSLER BUILDING
NEW YORK, N. Y.
William Van Alen
Architect
Fred T. Ley & Co., Inc.
General Contractor
Louis T. M. Ralston
Consulting Engineer

THE MANHATTAN CO. BUILDING
H. Craig Severance, Architect
Yasuo Matsui, Associate Architect
Morrell Smith, Archt. for Bank Quarters
Walker & Gillette, Assoc. Archts. for Bank
E. F. Abell, Equipment Specialist
Starrett Bros., Builders



The CANADIAN BANK of COMMERCE
TORONTO
Head Office Building
Darling & Pearson, Architects
York & Sawyer, Consulting Architects
E. F. Abell, Equipment Specialist
Anglin-Norcross, Ltd., General Contractors

Von Duprin

Self-Releasing Fire and Panic Exit Latches

The Advantage of the Separate Specification

There are two ways in which panic bolts are commonly specified. Some architects include them with the finishing hardware; others make them a separate item of the specifications.

The latter method has the very definite advantage of helping the building owner get what is specified. The former always tempts the occasional unscrupulous dealer to substitute cheaper devices as part of the finishing hardware contract.

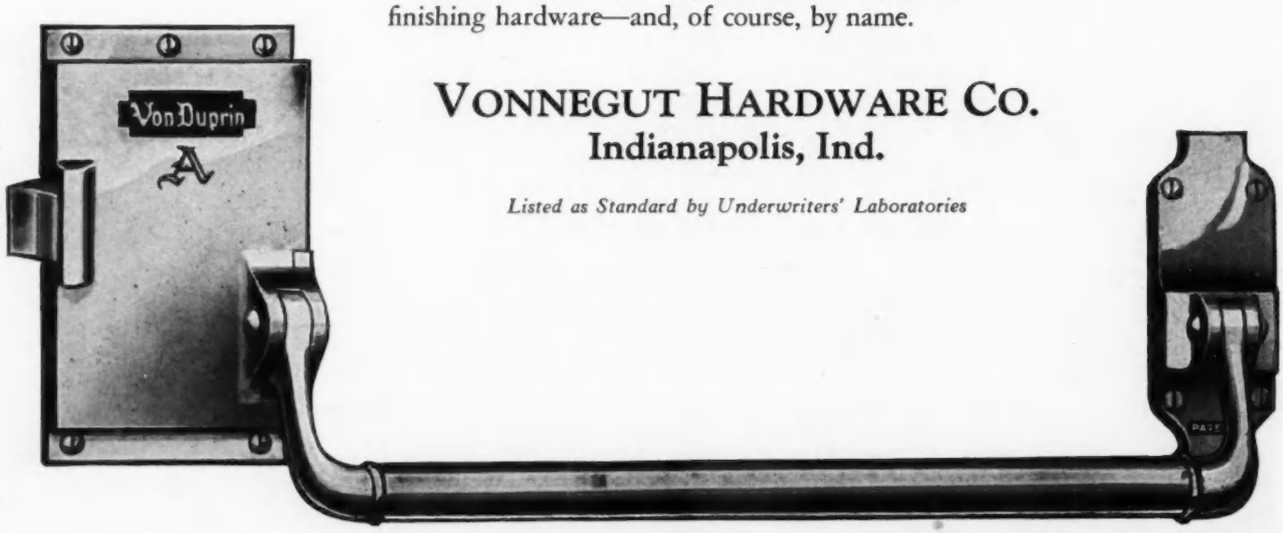
Sweets
Pages C3130-C3135

It is to prevent this that we protect all hardware dealers by selling every reputable dealer at the same fair prices.

As a further means of insuring the delivery of the genuine, we urge that you specify panic devices separately from the finishing hardware—and, of course, by name.

VONNEGUT HARDWARE CO.
Indianapolis, Ind.

Listed as Standard by Underwriters' Laboratories



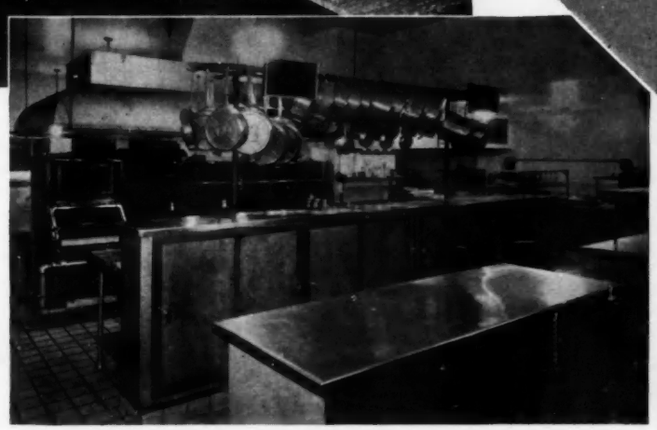
Five Years From Now Your Client Will Tell You This—

"Thanks again for recommending VAN Kitchen Equipment"

And ten . . . or even twenty . . . years later your client will say the same thing. Van Equipment makes lasting friends . . . for itself *and for you!* You have a right to the good will which it will bring you!

You can specify Van Equipment for the most limited appropriation. It meets every need, at a low first cost and with assurance of daily economy. Shall we send details?

Above, Van Kitchen serving the well known Hotel Andrew Johnson, Knoxville, Tenn.



Right, a fine Van equipped kitchen of the Colony Club, Detroit, Michigan

Five books on food service problems have just been prepared for architects. Gladly sent free, on request.

The John Van Range Co.
EQUIPMENT FOR THE PREPARATION AND SERVING OF FOOD
Cincinnati

DIVISION OF ALBERT PICK-BARTH COMPANY, INC.

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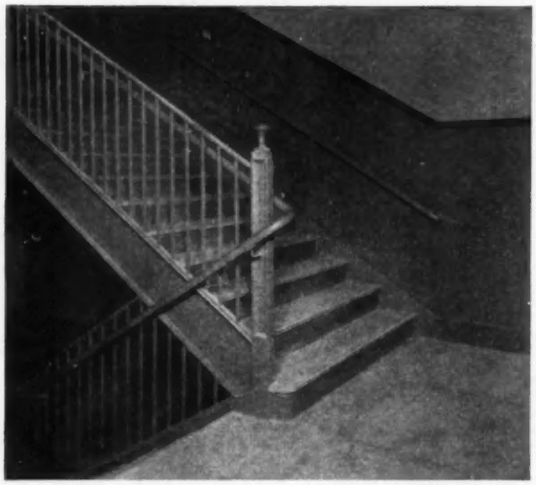
See SWEET'S
Pages C3798 —3801

The John Van Range Co., Oakley, Cincinnati, Ohio
Please send me, without cost or obligation:
☐ Planning Restaurants That Make Money. ☐ Practical Planning for School Food Service. ☐ Practical Planning for Church Food Service. ☐ Practical Planning for Hospital Food Service. ☐ Practical Planning for Club Food Service.
Name.....
Address.....
City..... State..... BH.6

Prominent Insurance Companies use Alberene Stair Treads

BELOW: *Alberene Stair Treads in Equitable Life Assurance Building.*



Insuring permanent satisfaction and no depreciation

1. DURABILITY—Alberene Stone stair treads have been in use for 21 years in the Provident Trust Company Building in Philadelphia. They have been, and still are, free of repair cost.
2. SAFETY—These treads are safe—wet or dry. They do not wear smooth, because the specially selected stone used for treads is high in abrasive content.
3. CLEANLINESS—Alberene Stone is moisture-resisting. Always easy to clean—and to keep clean.
4. FIREPROOFNESS—Streams of cold water can be played on heated Alberene treads without causing any cracking or breaking.
5. APPEARANCE—The natural light, blue-grey color gives good visibility against any background, and it harmonizes with any color scheme.

For use in office buildings or any type of public building, Alberene Stone stair treads and landings offer the advantages given above and others equally important, such as ease of machining, economy of installation, etc. Send for Bulletin on Stair Treads and Interior Uses.

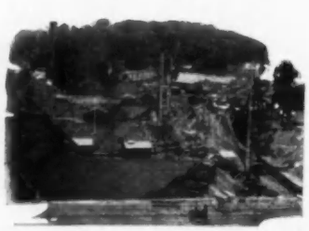
Typical Public Building Installations of Alberene Stone Stair Treads and Landings:

Buildings:	*Architects:*
EQUITABLE LIFE ASSURANCE BLDG., New York	Starrett & Van Vleck
PRUDENTIAL BLDG., Newark, N. J.	Cass Gilbert
FIDELITY MUTUAL LIFE INSURANCE CO., Philadelphia, Pa.	Zontzinger, Borie & Medary
NATIONAL CHAMBER OF COMMERCE BLDG., Wash'ton, D.C.	Cass Gilbert
PROVIDENT TRUST CO. BLDG., Philadelphia, Pa.	Rankin & Kellogg
CITY COURT BLDG., Buffalo, N. Y	Col. Howard Beck
WILLIAM PENN HOTEL, Pittsburgh, Pa.	Janssen & Cocken
MAYO CLINIC BLDG., Rochester, Minn.	Ellerbe & Co.
PENN ATHLETIC CLUB, Philadelphia, Pa.	Zantzinger, Borie & Medary
SOUTHERN RAILWAY BLDG., Washington, D. C.	H. W. Hasselbach
U. G. & I. BLDG., Philadelphia, Pa.	Perry Shaw & Hepburn
NEW YORK STATE OFFICE BLDG., New York City	W. E. Haugaard

ALBERENE STONE CO., 153 W. 23rd St., New York, N. Y.

Branches: Boston, Chicago, Newark, N. J., Washington, D. C. Cleveland, Pittsburgh, Richmond, Philadelphia, Rochester

Quarries and Mills at Schuyler, Virginia



One of the quarries on the 6,000 acre tract at Schuyler, Virginia.

ALBERENE STONE

THE NATURAL STONE OF DIVERSIFIED UTILITY

This brochure, ARCHITECTURAL ALBERENE, *sets forth in detail the interior and exterior uses of Alberene Stone.*

THE ARCHITECTS' VERDICT:

"Plaster needs STEEL REINFORCEMENT like reinforced Concrete in Principle"

The walls and ceilings of this artistic residence are lathed with RIBBED STEELTEX . . . the interior plaster is steel-reinforced for lifetime permanency.

RIBBED

STEELTEX LATH REINFORCES PLASTER WITH EMBEDDED STEEL . . . does it Automatically

Thousands of leading architects realize the value of STEEL REINFORCEMENT in plaster,—*that's their verdict.* But that is not all . . . there are other essentials, too. In fact, to obtain a permanent, quality plastering job, the plaster lath for interior walls and ceilings MUST give all TEN (10) results as indicated in the *MERIT CHART (at left, below).

Any plaster lath will give SOME of these ten results,—Ribbed *STEELTEX* lath for interior plaster gives ALL ten results . . . in a desirable and satisfactory manner. WHY COMPROMISE? Use Ribbed *STEELTEX* lath for interior plaster,—it is now suitable, economical and practical for every type of home or building . . . whether a costly mansion or humble cottage.

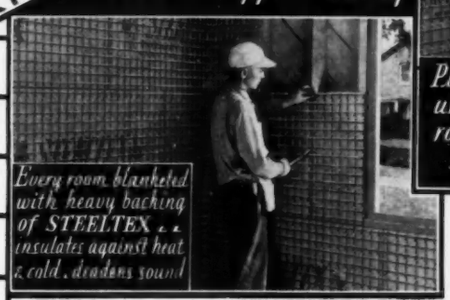
* MERIT CHART	Ribbed STEELTEX for Plaster
Reinforcing	√
Insulation	√
Sound deadening	√
Automatic back-plastering	√
Adds structural value	√
Added security over suction or plaster keys	√
Angle reinforcement at no added cost	√
Assurance of having proper and uniform thickness of plaster	√
Prevents lath marks from showing on finished plaster	√
Crack prevention	√

The Merit chart above shows the ten results you MUST get with a plaster lath to obtain the RIGHT job. Ribbed *STEELTEX* lath gives ALL ten results.

Ribbed *STEELTEX* is the easiest handled lath on the market . . . and comes in sheets, neatly packed in bundles, ready for application. Ribbed *STEELTEX* lath is quickly and easily applied and when plastered becomes a one-piece, solid STEEL-REINFORCED plaster slab . . . *like reinforced concrete in principle.*

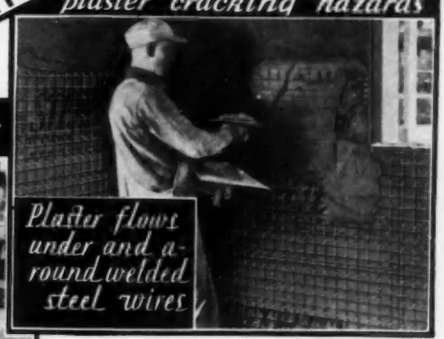
RIBBED

STEELTEX applies easily



RIBBED

STEELTEX minimizes plaster cracking hazards



In addition to RIBBED *STEELTEX* lath for interior plaster, there are THREE other styles of *STEELTEX* . . . same principle . . . same protection,—such as: *STEELTEX* for stucco,—*STEELTEX* for stone and brick veneer,—*STEELTEX* for floors and roofs (concrete and gypsum). *Write for free descriptive literature.*

The reinforcement of Ribbed *STEELTEX* is composed of a network of cold-drawn, electrically-welded steel wire (heavily galvanized). This steel mesh is securely woven onto a tough, pure-fibrous backing. Across the back of every *STEELTEX* sheet are rows of V-shaped metal RIB STIFFENERS . . . insuring board-like rigidity.

Write for the COMPLETE merit chart showing Ribbed *STEELTEX* lath IN COMPARISON with OTHER types of plaster lath . . . it's worth your effort . . . it's FREE . . . sign and mail the coupon below and get this interesting LATH COMPARISON CHART.

NATIONAL STEEL FABRIC COMPANY

Union Trust Bldg. Pittsburgh Steel Co. *Pittsburgh, Pa.*

WORLD'S LARGEST MANUFACTURERS OF WELDED STEEL FABRIC › › › ›

National Steel Fabric Company,
Union Trust Building, Pittsburgh, Pa. Dept. 50-E

Gentlemen: Please send your ☐ LATH COMPARISON CHART also your book ☐ "BETTER WALLS FOR BETTER HOMES." This request to obligate me in no way.

Firm Name .....

Individual's Name .....

Address .....

City ..... State .....

Prevent the line loss and expensive work that results from dew damage. Insulate all brine cold lines with moisture-resistant Novoid Cork Covering.

When dew gets into the covering on cold lines, and insulation is soaked, line losses go up. Pipe chases must be opened and the covering replaced.

Natural dewdrop magnified

Dew Damage *threatens every* COLD LINE

Novoid Cork Covering gives long service because it is moisture-proof

MOISTURE is the enemy of most cold pipe coverings. It works into crevices, spreads through the insulation—*and when cooled below the dew-point*—condenses as dew. Then the covering is useless and must be replaced.

But this does not happen where Novoid Cork Covering is used. Novoid Cork Covering is impervious to moisture.

That is why you can use Novoid Cork Covering on brine, ammonia or ice water lines running through hot, humid rooms. Or seal it up in partitions or pipe chases and know that it won't absorb moisture and have to be replaced in a short time.

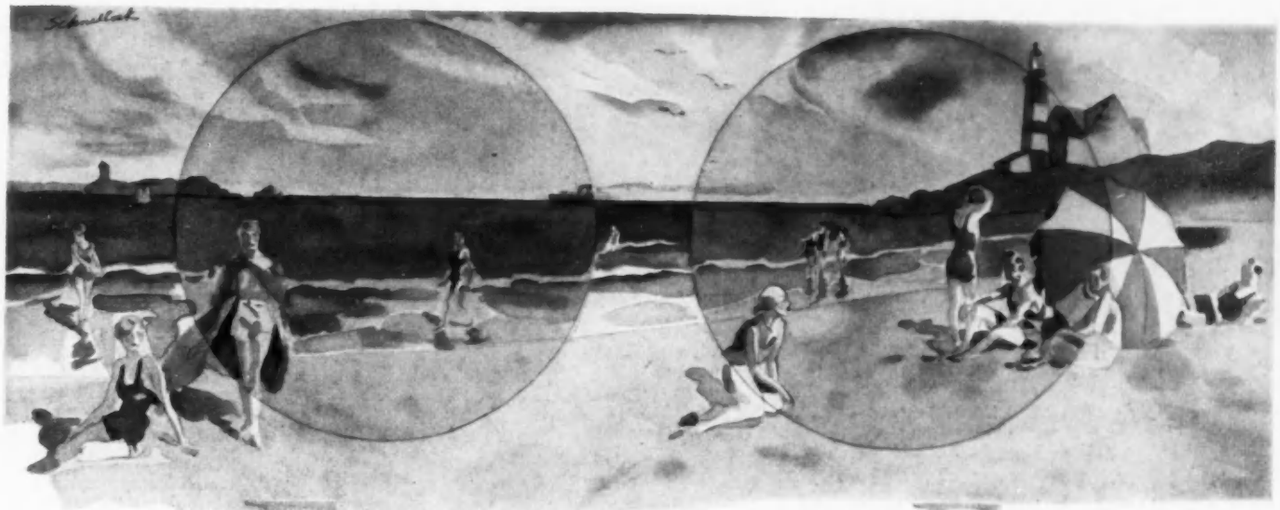
That, too, is why Novoid Cork Covering keeps its insulating value indefinitely. It stays dry and efficient and is not subject to progressive deterioration, which means steadily increasing lines losses and overloaded refrigerated machines.

Novoid Cork Covering is made for all sizes of pipes and fittings and in thicknesses suitable for all classes of cold lines from below-zero brine to drinking water.

Novoid Corkboard Insulation

CORK IMPORT CORPORATION 345 W. 40TH ST. NEW YORK

Samples and further information will be sent on request. Write to Cork Import Corporation, 345 West 40th Street, New York City.



as Easy on your Eyes *as sun glasses*

COOPER HEWITT light is as easy on your eyes as the light which comes to them through yellow-green sun glasses worn at the beach on a bright sunny day. Like sunlight, that is, with the glaring and much of the other irritating rays filtered out. But with this important difference: Cooper Hewitt light is not a filtered light, it just does not contain any irritating rays.

Science says the cool yellow and green rays of the spectrum are the rays by which we see best. The remarkable seeing power of Cooper Hewitt light is accounted for by the composition of its spectrum — over 90% yellow-green.

Yellow-green sun glasses, you know, absorb a large portion of all the rainbow colors of which sunlight is composed — *except* yellow-green, which the glass transmits. Thus yellow-green rays are in large measure practically the only rays which such sun glasses permit to enter your eyes. And not only do you see with greater comfort; but objects appear sharper and clearer, for these yellow-green light rays lie in the middle of the spectrum and are the rays by which human eyes see best.

Cooper Hewitt light is composed *almost entirely* of these soft, yellow-green rays. It comes to your eyes from the long (50-inch) tube of radiant mercury vapor as the essence of clear, transparent, sharp-seeing daylight, perfectly diffused. No glare. No dark shadows. All objects under it stand out as sharply and clearly as if magnified.

Little wonder then that in industries where efficiency is the watchword — where vision must be keen and quick — and where the comfort of workers is rightfully considered important — Cooper Hewitt light is everywhere in use. Most of the leading automobile plants are lighted with Cooper Hewitt lamps. So are the mechanical departments in many of the leading newspapers. Likewise, the big furniture factories, textile mills, etc.

Blue and violet which have comparatively little seeing power, comprise less than 10% of Cooper Hewitt light.

It will interest you to learn the many advantages — in the use of Cooper Hewitt illumination. A new illustrated booklet, "Why Cooper Hewitt Light is Better than Daylight," is yours for the asking. General Electric Vapor Lamp Co., Hoboken, N. J.

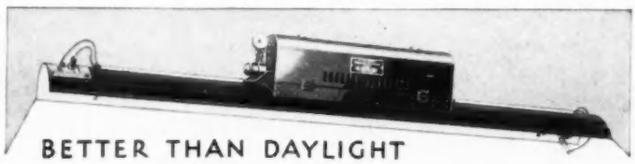
Join us in the General Electric Hour, broadcast every Saturday evening at 9 o'clock E.S.T. on a nation-wide N. B. C. network.

GENERAL ELECTRIC
VAPOR LAMP COMPANY
(Formerly Cooper Hewitt Electric Company)

[See next page]

where WOULD *you go to thread a needle?*

In an exaggerated circumstance—say, when you thread a needle—you recognize instantly the importance of both the adequacy and the direction of light. And just so does light play its part in your industrial plant.



. — .

Poor lighting annually exacts a tremendous toll from American industry. It is responsible for a high percentage of the "seconds" turned out in every plant. It is the direct cause of innumerable mistakes all along the production line, wasting materials, wasting time, wasting profits.

. — .

Exact figures on the number and value of rejects, seconds and other losses caused directly and indirectly by inadequate and improper lighting are, of course, most difficult to obtain. But this much can be said:

. — .

Only 15 per cent of America's industrial plants are adequately and properly lighted. In these, accidents are comparatively few, seconds run low and production is high.

. — .

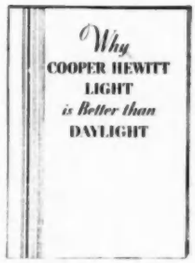
Only 29 per cent can be said to be "fairly well lighted." In these, accidents are more common, the percentage of seconds runs higher and production is lower.

. — .

The remaining 56 per cent of all industrial plants are classed as poorly lighted. And in these, investigation has shown, the accident rate is high, the percentage of seconds is high and production is lowest.

. — .

Cooper Hewitt mercury-vapor light, as some thirty different industries in America have discovered, is *the* light that "gets the industrial needle threaded." Some reasons why it helps reduce waste to a minimum, improves quality, and increases efficiency and profits generally are given on the opposite side of this page. Many of the reasons are simply explained in the new illustrated booklet, "Why Cooper Hewitt light is Better than Daylight." Free for the asking. Address: General Electric Vapor Lamp Co., 893 Adams St., Hoboken, N. J.



JOIN US in the General Electric Hour broadcast every Saturday evening on a nation-wide N. B. C. network

GENERAL ELECTRIC
VAPOR LAMP COMPANY

(*See preceding page*)

(*Formerly Cooper Hewitt Electric Company*)

419 G. E. V. L. Co. 1930

DAYTON POWER AND LIGHT

RE-ROOFED while the PLANT was RUNNING

17-Point
Holorib Roof Deck

1 A copper-bearing steel roof deck, combined with sufficient insulation to prevent condensation.

2 A long-lived roof, requiring a minimum of maintenance.

3 Its light weight reduces the requirements of the structural steel—(one square foot of Holorib weighs approximately 5 lbs., including insulation and waterproofing).

4 Carries required loads over wide purlin spacing with ample factors of safety.

5 Makes a firm, smooth and inherently dry mopping surface for the application of insulation and roofing felts. The affinity of its component parts gives it a much longer life than other roofs.

6 Quickly laid. Speeds the completion of the building.

7 May be laid in any weather men can work — nothing to pour — nothing to freeze — nothing to dry out.

8 Applicable to flat, pitched, saw-tooth, monitor, bowstring or curved surfaces.

9 Unaffected by atmospheric changes. Expansion and contraction are negligible.

10 Saves winter fuel. Provides cooler interiors in warm weather.

11 Saves insurance. Takes a fireproof rating when used over incombustible contents.

12 Telescoping end laps made over the purlins form tight interlocking joints.

13 Triangular reinforcing ribs running longitudinally in the sheet form a continuous beam that rests directly on the purlins.

14 May be welded in place forming a rigid yet self-adjusting foundation for insulation and waterproofing.

15 Lower in cost than any other types of fire-resistive roof of the same insulating efficiency.

16 Provides attractive ceilings. It is not a dust collector.

17 May be used as a highly satisfactory floor with or without concrete.

The Dayton Power & Light Company of Dayton, Ohio, was forced to re-roof its Fourth Street plant, and keep more than a million dollars' worth of electrical machinery dry and in operation.

As the old roof was removed, Fenestra Holorib deck was immediately laid with insulation and roofing felts asphalted on top. Each night the growing Holorib roof was joined to the diminishing old roof and waterproofed.

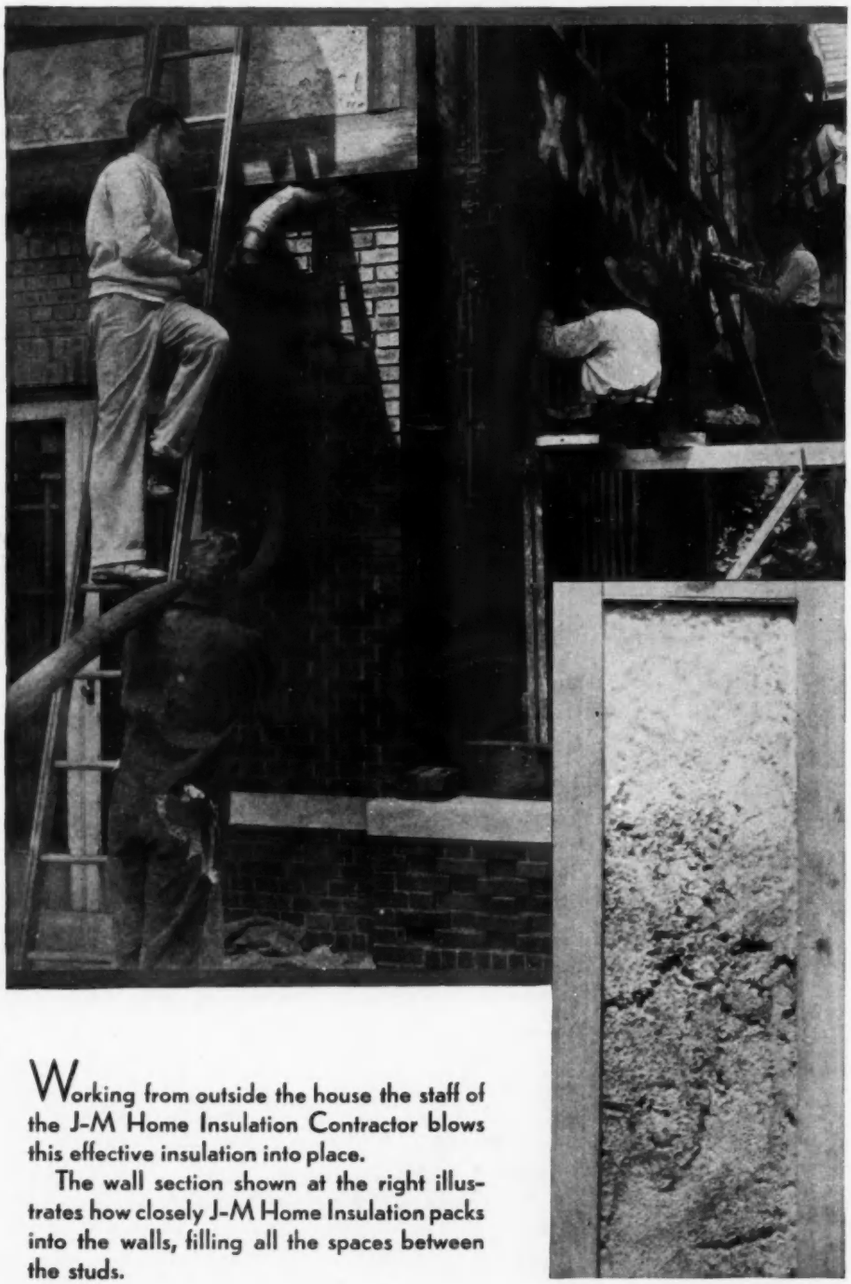
Fenestra Holorib is now a part of the Detroit Steel Products Company; sold through country-wide Fenestra Holorib representatives and backed by the oldest and largest steel window manufacturer in America. Immediate shipments are available. Engineering and designing service for the asking without obligation. Telephone the nearest Holorib or Fenestra representative or write for literature to:

Fenestra Holorib Division

DETROIT STEEL PRODUCTS COMPANY
2250 East Grand Boulevard Detroit, Michigan

Fenestra
HOLORIB
ROOF DECKS FLOOR FORMS

JOHNS-MANVILLE
J·M
PRODUCTS



Working from outside the house the staff of the J-M Home Insulation Contractor blows this effective insulation into place.

The wall section shown at the right illustrates how closely J-M Home Insulation packs into the walls, filling all the spaces between the studs.

Johns-Manville
HOME
INSULATION

JOHNS-MANVILLE
JM
PRODUCTS

Here, we believe, is the ultimate in home insulation . . . .

HOUSE insulation is becoming an increasingly important matter, as your clients become more and more familiar with the subject — as they become more interested in increasing home comforts and reducing heating costs.

We have developed a unique method of applying an old and tried insulating material to the job of controlling temperature changes and heat losses in dwellings and other buildings. This material, of which J-M Home Insulation is made, is rock wool, long familiar for its high resistance to the passage of heat.

A Unique Method of Application

To put this light, loose, woolly material, firmly into place, we have perfected a method of blowing it, by means of compressed air, into the spaces between the inner and outer walls. This method insures filling every nook and cranny in the walls, without any dirt or litter about the job. It is really the first practical method of insulating finished structures. J-M Home Insulation is equally effective in an old house or one under construction and can be applied with equal ease to both.

An Invisible Inner House

The result of applying J-M Home Insulation is an invisible barrier to heat built within the walls. Without being seen, and without the slightest effect to your design, it makes the house more comfortable and pleasanter to live in—and more efficient to operate. The insulation value of J-M Home Insulation in a wall having 2" x 4" studs is equivalent to that of eleven feet of solid concrete — surely a showing which can be called remarkable.

It is our desire to be real co-operators with architects in connection with our Home Insulation as with all of our diversified products. That is why we maintain a staff of architecturally trained men, who have mastered thoroughly the technical details of J-M Home Insulation as well as our other products. They welcome opportunities to be of assistance to you in connection with any plans in which insulation is being considered.

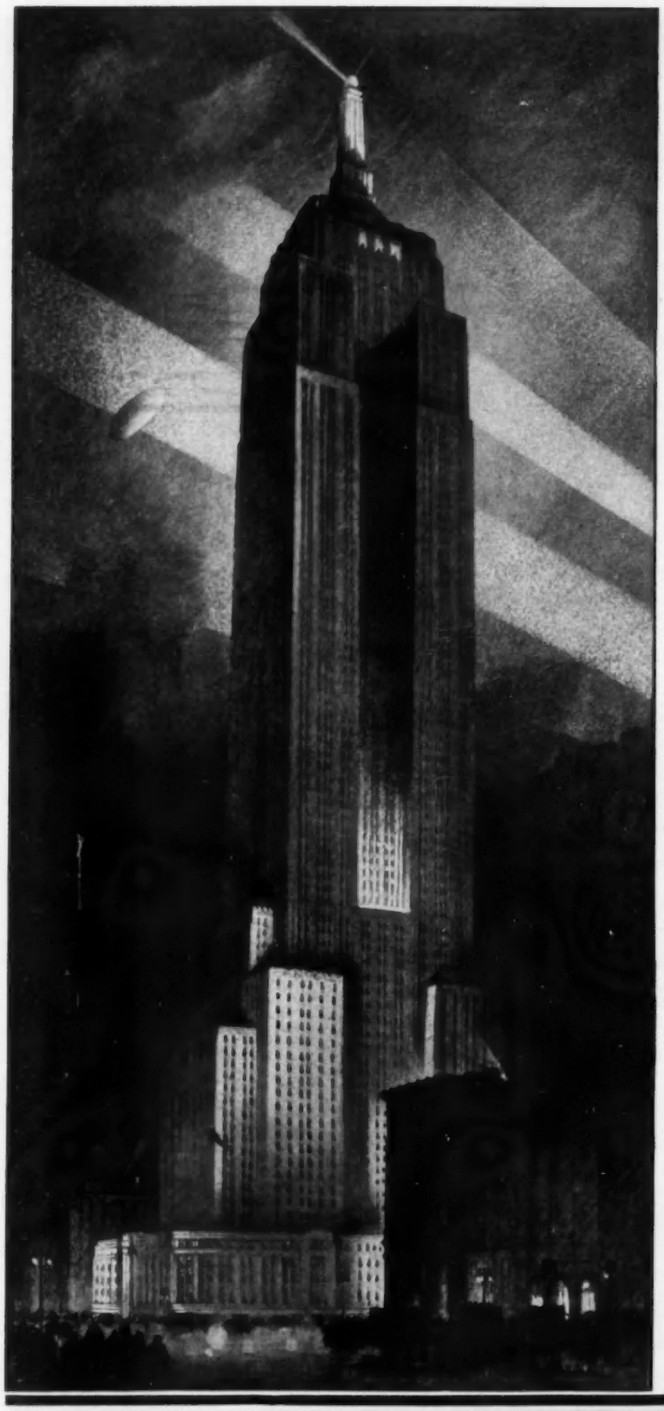
JOHNS MANVILLE JM PRODUCTS

FOR THE BUILDING INDUSTRY

Acoustical Materials
Home Insulation
Asbestocel Pipe Insulations
Insulating Board
Transite
Asbestos and Asphalt Shingles
Tile Flooring
Built-Up Roofs
Floridene Stone

Johns-Manville

New York Chicago Cleveland
San Francisco Toronto



—and NOW Empire State

EMPIRE STATE — Chrysler — Bank of Manhattan — Equitable Trust — No. 1 Wall St.—Daily News—New York Life—the largest and tallest of our modern office buildings use Orangeburg Underfloor Wiring Systems.

Forming a hidden network of wireways beneath the floor—the fibre duct can be easily tapped to make outlets *exactly* as desired. Permanent—economical—convenient.

For 9 years, Orangeburg Systems have been serving office buildings as the most effective method of wire distribution.

THE FIBRE CONDUIT CO.
Makers of Orangeburg Fibre Conduit since 1893
292 MADISON AVE., NEW YORK, N. Y.

ORANGEBURG
UNDERFLOOR
FIBRE DUCT SYSTEM

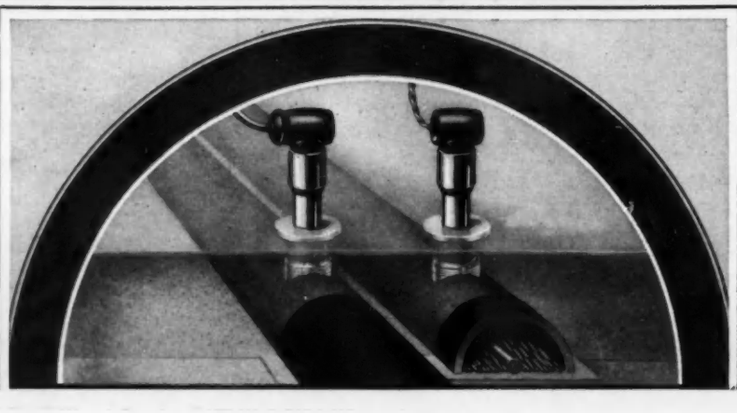
EMPIRE STATE BUILDING

Shreve, Lamb & Harmon
Architect

Meyer, Strong & Jones
Engineer

Starrett Bros., Inc.
Builder

L. K. Comstock & Co.
Electrical Contractor

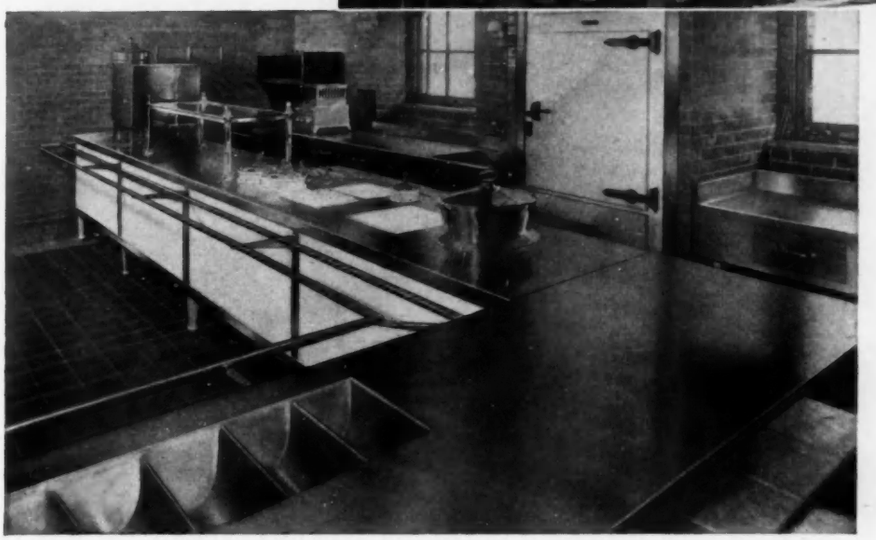


A few other leading office buildings using Orangeburg Systems

Western Union Bldg., N. Y.
N. Y. Telephone Co., N. Y.
Rand Building, Buffalo, N.Y.
Aetna Life Insurance Co. Hartford, Conn.
Fidelity-Philadelphia Bldg. Phila., Pa.
Sun Life Ins. Co., Montreal
Canadian Bank of Commerce Toronto
Dept. of Commerce Bldg., Washington
Koppers Bldg., Pittsburgh
And many others.

4110

GLEAMING Monel Metal



The Montefiore Hospital, Pittsburgh, Pa., has Monel Metal food service equipment, installed by THE BERNARD J. GLOEKLER COMPANY, *Pittsburgh, Pa. Architect:* SCHMIDT, GARDEN & ERICKSON, *Chicago, Ill.*

View of Nurses' Cafeteria, Montefiore Hospital. The table top, work bench, sinks, cafeteria counter trim, railings, refrigerator trim, linings, are all Monel Metal, installed by The Bernard J. Gloekler Company, Pittsburgh. In the left hand corner may be seen a Monel Metal urn manufactured by THE LYONS SANITARY URN COMPANY, *New York.*

. . . the mark of the modern hospital kitchen

MODERN hospitals may differ widely in the design and construction of appointments and appurtenances, but there is one respect in which most progressive institutions are alike. These leaders almost invariably use food service equipment of Monel Metal.

The reason for this is simple: Monel Metal is the *only* material that combines all the properties and advantages essential to the most efficient and economical operation of hospital kitchens. It alone affords complete immunity to rust and resistance to corrosion, together with steel-like strength and lasting attractiveness.

Monel Metal is widely specified because it facilitates scrupulous cleanliness with little cleaning. Its sanitary, silvery surface requires no attention beyond ordinary care. It has no coating to chip, crack or wear off.

These pronounced advantages not only find high favor with hospital dieticians and chefs—they are appreciated by hospital executives and others who also recognize the broader usefulness of Monel Metal in other branches of hospital service, such as clinical and laundry equipment.

To complete your file of Monel Metal hospital data, send for "Modern Kitchens," a 72-page illustrated book on the specification and construction of food service equipment.

The interesting story of Monel Metal—its properties and uses—is portrayed in a new 2-reel motion picture film. Write for details of free distribution.

MONEL METAL

Monel Metal is a technically controlled Nickel-copper alloy of high Nickel content. It is mined, smelted, refined, rolled and marketed solely by The International Nickel Company. The name "Monel Metal" is a registered trade mark.

INCO MONEL METAL

THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL STREET, NEW YORK, N. Y.

No. 69 of a series of advertisements featuring prominent laundry installations

How about
floor space?
ceiling clearance?
equipment?
elbow room?

TODAY, you see large laundries tucked into little space. You see gravity put to work, feeding linens down from top-floor washrooms. Smooth-working conveyors eliminate cumbersome trucks—machinery replaces muscles.

If you are designing any kind of a laundry . . .

. . . American Laundry Machinery Company engineers stand ready to assist you. They know laundry practise. They have helped with the planning and equipping of small, one-unit installations, as well as mammoth, multi-story plants. And, they are glad to place their experience at your disposal, without obligating you in any way.

Morrissania Hospital, New York City. This vast medical center has a modern laundry of its own, planned and equipped with the cooperation of "American" engineers.

A view of the American monel metal Cascade Washers and the human-automatic extracting equipment in the Morrissania Hospital's fine washroom. Notice also the row of American Eagle Presses in the spick-and-span ironing department.

C. B. Meyers, 31 Union Square, New York City, N. Y.—Architect.

THE AMERICAN LAUNDRY MACHINERY COMPANY, *Norwood Station*, Cincinnati, Ohio

The Canadian Laundry Machinery Co., Ltd., 47-93 Sterling Road, Toronto 3, Ont., Canada
Agents: British-American Laundry Machinery Co., Ltd., Underhill St., Camden Town, London, N. W. 1, England

The St. George, Brooklyn, N. Y.

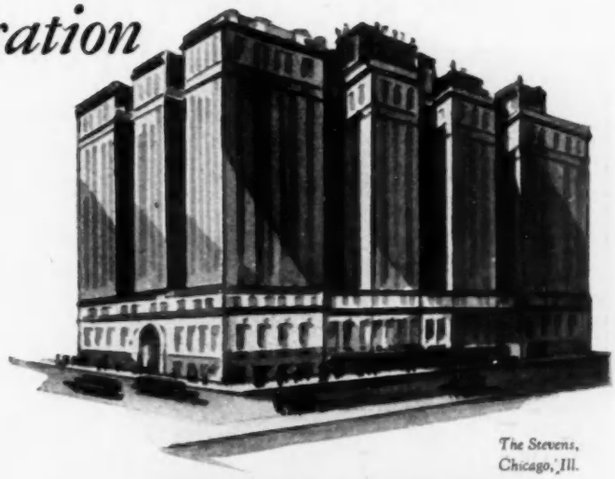
At your Service in the world's two Largest Hotels ....*Carbondale Refrigeration*

Conditioning air; freezing ice; cooling drinking water, refrigerators and cold storage rooms; freezing ice cream — such is the service rendered by Carbondale at the Stevens, the world's largest hotel. And now at the St. George, the largest hotel in greater New York, second only to the Stevens, Carbondale Refrigeration is providing comfort for the thousands of guests.

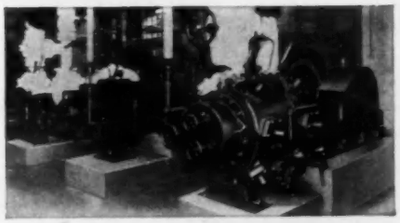
No greater testimonial could be extended to Carbondale than the selection of its refrigerating equipment for these leaders in the hotel field. Architects, engineers and owners have confidence in Carbondale equipment—confidence that is based on performance over a period of more than 35 years, in every business and industry that uses refrigeration.

The assistance of our engineering department is freely offered in helping to apply the most efficient refrigerating system for any cooling, freezing, or air conditioning need.

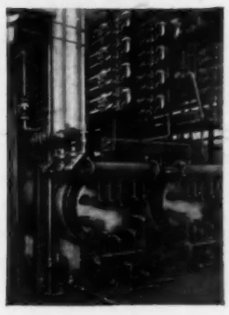
THE CARBONDALE MACHINE COMPANY
Carbondale, Pa. *Branches in principal cities*



The Stevens, Chicago, Ill.



Worthington "Feather Valve" (Reg. U. S. Pat. Off.) compressor used exclusively in the Carbondale Compression Refrigerating System



A typical absorbtion refrigerating installation showing generators with rectifiers and exchangers mounted above.

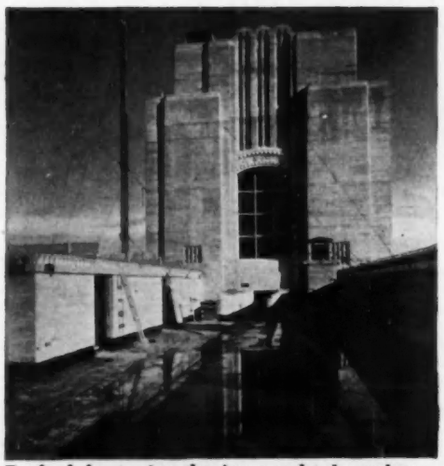
Carbondale Refrigeration
CARMACO
ABSORPTION AND AMMONIA COMPRESSION MACHINES

CARBONDALE AMMONIA COMPRESSION REFRIGERATING SYSTEMS USE WORTHINGTON "FEATHER VALVE" COMPRESSORS

MINWAX PRODUCTS • PROTECT • SEAL • BEAUTIFY

Los Angeles County Hospital, Los Angeles, California; Architect—Allied Architects of Los Angeles; General Contractor—Weymouth Crowel; Waterproofing Contractor—Owen Roofing Company.

361,000 SQUARE FEET OF CONCRETE *protected with* MINWAX Membrane Waterproofing



Roof of front wing showing completed membrane covered with slab reinforcing mesh. The roof has been flooded and proved absolutely watertight.

One of the 21 refrigerator rooms in which all surfaces are completely covered with Minwax Membrane Waterproofing.

In the new Los Angeles County Hospital Minwax Membrane Waterproofing was specified for all areas requiring absolute, elastic and permanent protection against moisture. Membrane Waterproofing was used for all roofs to be covered with tile (except some very small ones), all terraces and outside steps extending over portions of the building, inside of four pools, the bottom and side walls of the sunken gardens, floor and ceiling of the crypt, all surfaces of 21 refrigerator rooms, roof and side walls of tunnels, bottom and sides of elevator pits and the exterior of all basement walls against which fill will cover.

An additional contract calls for Membrane Waterproofing under 136 sterilizers, under the floor slabs of 9 tank rooms, two inside swimming pools, the floors and side walls of all shower rooms and several smaller areas where moisture may occur.

Minwax Membrane Waterproofing is built up on the job as a continuous blanket to completely surround or cover the surface to be protected. Besides giving positive and permanent waterproofing, it is superior to all other methods, because, being elastic and stretchable, it takes care of both vibration and temperature changes.

Today Minwax offers the architects of the country a service, experienced and effective in every problem of waterproofing, damproofing and preserving masonry and wood.

TRADE MINWAX MARK

MINWAX CO., Inc.

Branch: 232 E. Ohio St. Chicago, Ill. | 11 West 42nd Street New York City | Factory: Delawanna New Jersey

A complete service for waterproofing, dampproofing and preservation of masonry and wood.

Representatives: Refer to telephone directory or see Sweet's Catalogue.

Canadian Representative: The Raines Co. of Can., 1008 Anderson St., Montreal, Q.

A Convenience feature of the modern Residence

On the estate of Mr. Monroe Eisner, Red Bank, N. J., are fourteen telephone outlets: eleven in the residence, and one each in the superintendent's cottage, the stables and a detached garage. Built-in conduit connects these outlets and carries the wiring for the telephone system which includes intercommunicating features. The dining-room and breakfast-room outlets are served with a portable telephone.

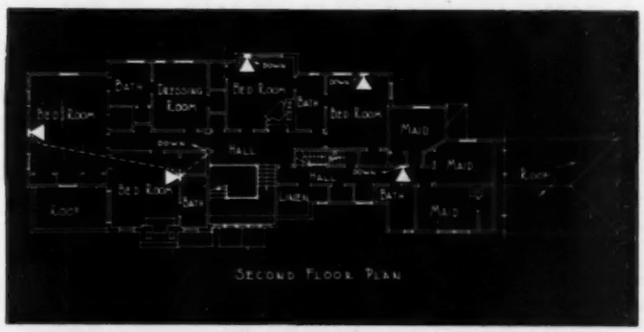
FRED M. TRUEX, Architect, *New York City.*

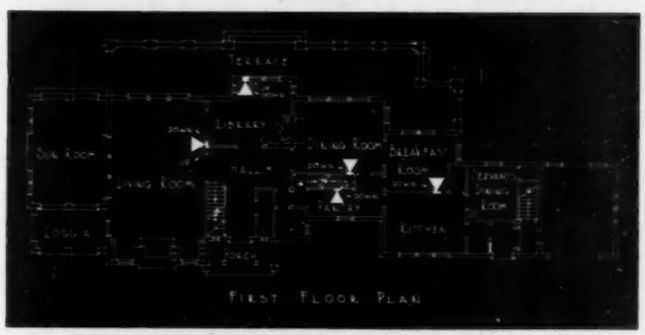
Telephone outlets *throughout* the house

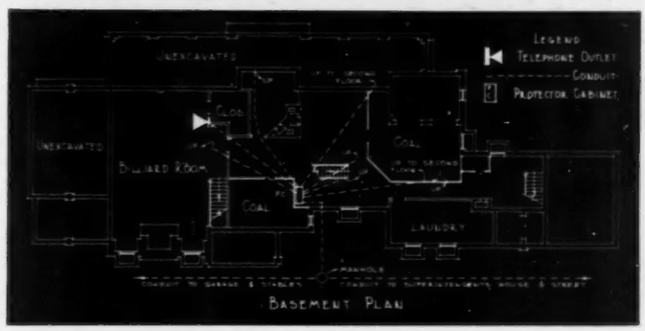
THE TELEPHONE REQUIREMENTS of the modern household are radically different from those of a few years ago. Telephones are needed in many locations . . . living-room, library, dining-room, kitchen or pantry, breakfast nook, garage, game room, bedrooms, servants' quarters . . . wherever, in fact, they will save steps and time, and add to comfort and convenience.

Many architects are meeting this demand for complete telephone convenience by specifying conduit for the telephone wiring in their plans for new and remodeled residences. In this way they provide for telephone outlets in all of the important rooms. The home owner can use just those he desires, and he can readily expand or rearrange the service to meet changing needs. In addition, he can enjoy the improved appearance that results from concealed wiring.

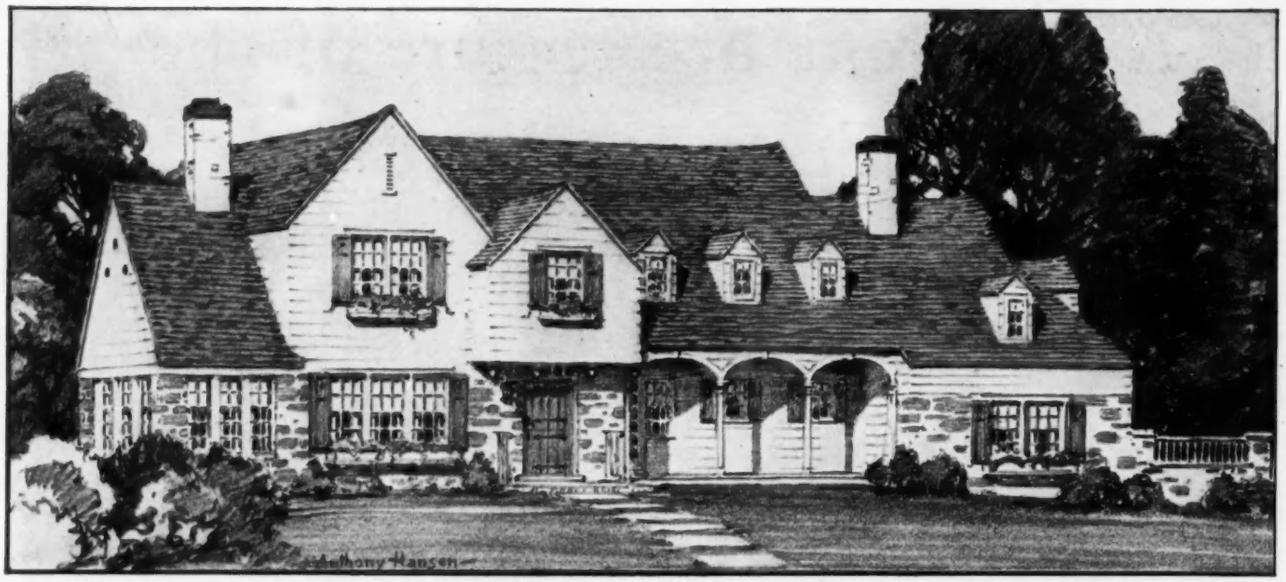
Your local Bell Company will gladly confer with you and your clients in planning the telephone arrangements for all your building projects. There is no charge. Just call the Business Office.







THE COAT OF METAL PROTECTION



Study the COST FIGURES for priming and back-priming this house with Aluminum Paint

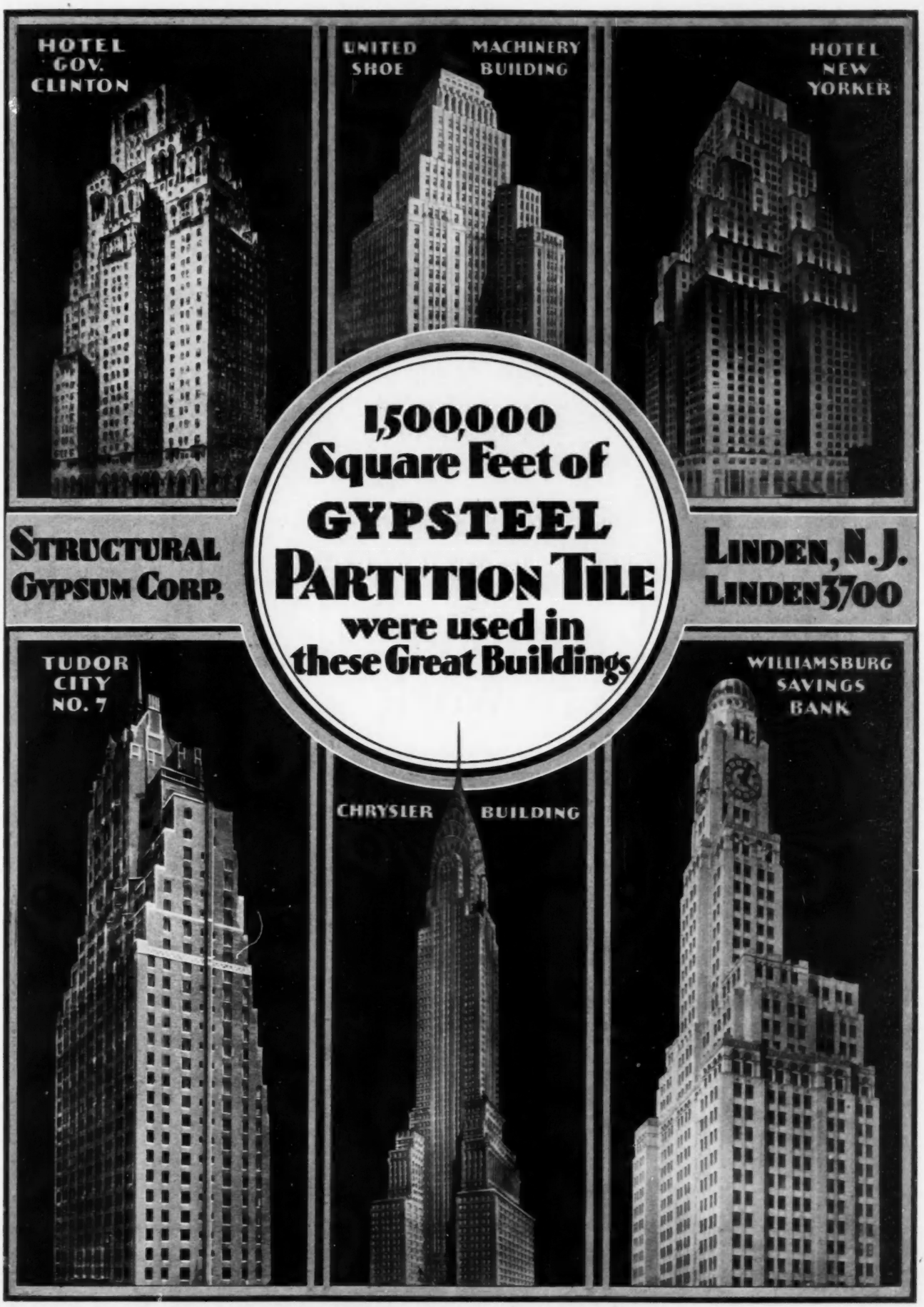
HOW does the cost of priming with aluminum paint compare with "lead and oil" priming? How much does "back-priming" add to the cost? The best way to answer these questions is to give comparative figures on a specific house.

The original estimate for painting the 10 room colonial house shown above, including interior and exterior knot sealing with shellac, priming *without back-priming*, with lead and oil and two finish coats was $1225.80. At the owner's request the specifications were altered to—Aluminum paint made with Alcoa Albron Powder and a suitable vehicle for priming *both front and back* of lumber. Knot sealing was of course unnecessary. The new figure, including the two finish coats, was $1300—only $74.20 extra for an infinitely better job. Moisture seeps into wood from both sides—priming and back-priming with aluminum paint checks moisture penetration. And as these figures prove, it adds very little to the expense of painting.

Aluminum Company of America does not sell paint. But aluminum paint made with satisfactory vehicles and Alcoa Albron Powder can be purchased from most reputable paint manufacturers, jobbers and dealers. Be sure the pigment portion is Alcoa Albron and is so designated. Let us send you the booklets, "Aluminum Paint, the Coat of Metal Protection" and "Specifications for Aluminum Paint". Address ALUMINUM COMPANY *of* AMERICA; 2412 Oliver Building, PITTSBURGH, PA.

ALCOA ALBRON
POWDER FOR
ALUMINUM PAINT

ALCOA ALUMINUM ALBRON


HOTEL GOV. CLINTON
UNITED SHOE MACHINERY BUILDING
HOTEL NEW YORKER
1,500,000 Square Feet of GYPSTEEL PARTITION TILE were used in these Great Buildings
STRUCTURAL GYPSUM CORP.
LINDEN, N.J. LINDEN 3700
TUDOR CITY NO. 7
CHRYSLER BUILDING
WILLIAMSBURG SAVINGS BANK

Delivered complete.. ready to go to work

PLANS and layout drawn . . . machinery, equipment and accessories specified and installed . . . provision made for future expansion . . . laundering processes formulated . . . operating staff organized . . .

TROY ARCHITECTS' ADVISORY SERVICE is prepared to take care of every step in the planning and equipping of the institutional laundry. Troy specialists will deliver to your client a plant, complete in every way, set up and ready to work as a going concern.

Let Troy cooperate with you. Without charge or obligation, Troy will handle the entire laundry job from the preliminary stages through to actual operation. Feel free to take advantage of this service.

TROY LAUNDRY MACHINERY CO., INC.

Chicago—New York City—San Francisco—Seattle—Boston—Los Angeles

JAMES ARMSTRONG & CO., Ltd., European Agents: London—Paris—Amsterdam—Oslo

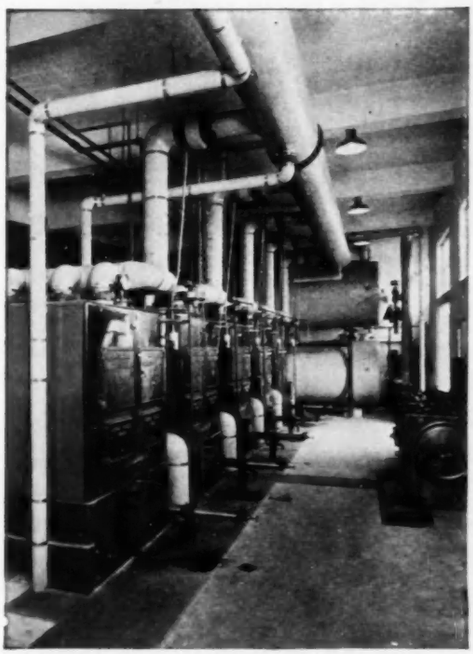
Factories: East Moline, Ill., U. S. A.

TROY

LAUNDRY MACHINERY

SINCE 1879 . . . THE WORLD'S PIONEER MANUFACTURER OF LAUNDRY MACHINERY

• In California's newest school



MODERN WARMTH protects the pupils

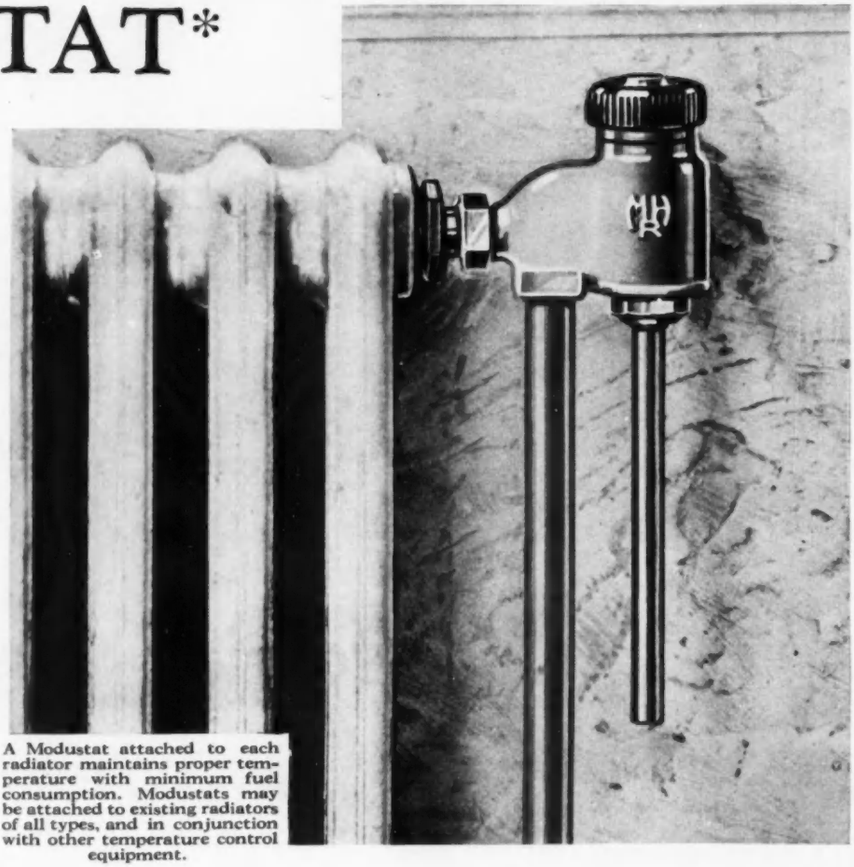
The new East Oakland High School is a fine example of the thorough planning and construction that goes into most public buildings today.

Naturally when it came to heating equipment only the most efficient plant could be considered. That is why a battery of five Ideal Redflash Boilers was installed—one of the largest low pressure heating installations on the Pacific Coast.

AMERICAN RADIATOR COMPANY

40 WEST 40th STREET, NEW YORK, N. Y.

Every Radiator "Thinks" for Itself with the *new* MODUSTAT*



A Modustat attached to each radiator maintains proper temperature with minimum fuel consumption. Modustats may be attached to existing radiators of all types, and in conjunction with other temperature control equipment.

Automatically maintains a temperature to suit the occupants of each individual room . . . . .

Now the Modustat, a new type self-contained *modulating* radiator valve, is available to bring new satisfaction to radiator heating systems. The Modustat lets each radiator act independently of all others—the valve automatically modulates so as to maintain any desired temperature.

Neat, simple, sturdy construction on a *new principle* insures accuracy and dependability. The Modustat is a worthy new member of the Minneapolis-Honeywell Regulator family, for 45 years in the forefront of heat control development.

In office buildings, hotels, hospitals, and the better class of homes and apartments, Modustats repay their cost in fuel saving. More comfortable and healthful conditions result from a smaller range of temperature variations. Minneapolis-Honeywell Regulator Company, 2722 Fourth Avenue South, Minneapolis, Minn.

Automatic Temperature *and* Pressure Regulation

Minneapolis-Honeywell temperature and pressure controls and motor valves are available for every type of room or space heating installation. Send for our catalog.

MINNEAPOLIS
HEAT REGULATOR
HONEYWELL

*RELIABLE *individual radiator control—an important new heating development.*

Because the Corrosive action of Water VARIES

these TWO *kinds of* Brass Pipe *are now made*

For HIGHLY corrosive water
ANACONDA 85 Red-Brass Pipe

For NORMALLY corrosive water
ANACONDA 67 Brass Pipe

WHEN water flows from the faucet, it is more than hydrogen and oxygen. It contains minerals or compounds absorbed by water before it reaches the reservoir. These compounds vary. In some localities, they make water highly corrosive—in others, normally so. Even within a 25-mile radius, the water supplies may differ considerably in degree of corrosiveness.

Brass pipe outlasts ferrous water pipe under all conditions. But because of these compounds in water, not all brass pipe alloys give equally satisfactory service everywhere. Continuing its efforts to be of service to architects, The American Brass Company has developed two alloys of Anaconda Brass Pipe to give adequate service under any local water condition.

For normally corrosive waters—Anaconda 67 Brass Pipe. This pipe contains 67% copper. It is guaranteed structurally sound and physically perfect. It is semi-annealed and seamless.

For highly corrosive waters—Anaconda 85 Red-Brass Pipe. This pipe contains 85% copper, and is offered as the best corrosion-resisting pipe obtainable at moderate cost. It, too, is fully guaranteed.

Seventeen years of careful research in the laboratory and in actual use have demonstrated the necessity for and the efficiency of these two brass pipe alloys.

A Service for Architects

The Technical Department of The American Brass Company is prepared to help determine the character of any local water supply and to recommend the alloy of Anaconda Brass Pipe that will best meet specific conditions. The American Brass Company, General Office: Waterbury, Connecticut.

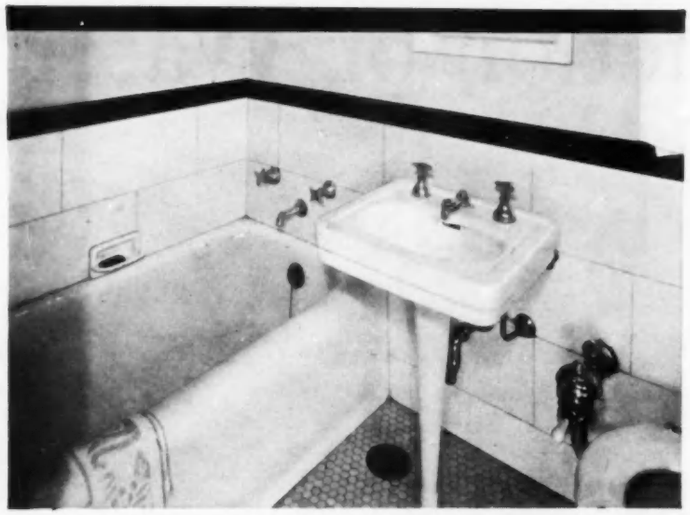
ANACONDA

ANACONDA BRASS PIPE

FOR HOT AND COLD WATER LINES

"THE BEST SALESMAN WE EVER HAD . . ."

ONE LOOK AT AN ALL-KOHLER BATHROOM . . . MAY CLINCH THE SALE



Bathroom in the Villa Locarno Apartment House, Kansas City, Missouri, having STANDISH *vitreous china lavatory and* VICEROY *tub, both with Kohler Dynamic fittings. Architect, Alonzo H. Gentry; Builder, McCanles Building Co.; Plumber, Laitner Plumbing & Heating Co.; Jobber, Kellogg-Mackay Co.*

Bathroom in Eddystone Homes, 401 Melrose Street, Chicago, Ill., showing STANDISH *vitreous china lavatory with Kohler Dynamic combination fittings.* VICEROY *bath is equipped with Rapidrain. Architects, Holabird & Root; General Contractors, A. W. S. Construction Co.; Plumber, Charles R. Ewing, Jr.; Jobber, Western Plumbing Supply Co.*

ELEVEN IMPORTANT POINTS ABOUT PLUMBING

1 *Kohler designs* are decorative, purposeful, correct.

2 *Kohler enamel* is made by an exclusive formula, fused with an everlasting bond and keeps its smooth, glistening surface.

3 *Vitreous china* pieces are sculptured for beauty and service . . . vitrified at high temperatures and armored with a smooth, lustrous, lasting glaze.

4 *Kohler colors* are soft, livable pastels . . . the white is a perfect white.

5 *Kohler metal fittings* are engineered for efficiency . . . *heavily plated* with chromium, nickel or gold. They match the fixtures in style, character and quality.

6 *Materials* are the finest—*manufacture* is most particular. All Kohler products show craftsmanship and care.

7 This company *pioneered* many of the big advances in plumbing. This year's Kohler products are next year's new ideas.

8 Kohler quality extends to the *kitchen and laundry*—for every plumbing need.

9 Kohler quality *costs no more* . . . and saves money later.

10 Kohler fixtures and fittings are handled and installed by qualified plumbers.

11 Back of the Kohler trade-marks are the traditions and spirit of *an entire community* . . . beautiful Kohler Village.

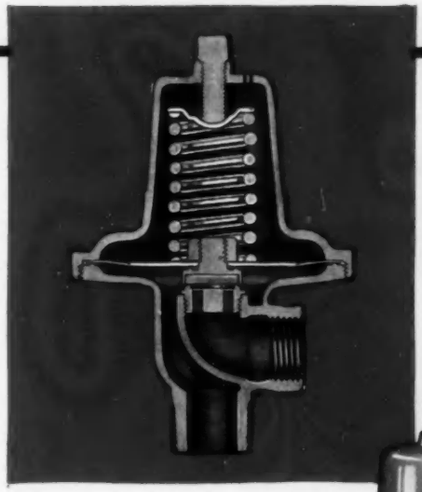
HOME HUNTERS these days are asking to see the bathroom first. They are looking for color, for good design, for modern convenience. They know that only fine plumbing fixtures and fittings can ever be good enough. And they know the meaning of the Kohler mark—in terms of beauty, efficiency, safety and permanence.

One builder stated that the Kohler installation he put in helped sell out his operation more than any other single feature of the job. Others are equally emphatic in giving special credit to Kohler colors and Kohler quality. Architects have found that all-Kohler bathrooms and kitchens have a charm all their own—a precision that adds years of perfect service.

Read the eleven important points about plumbing and figure for yourself how much Kohler fittings can add to the living comfort, the convenience, and the economy of the houses you plan. Specifications for all-Kohler installations please all concerned—builder, tenant, and owner. . . . Remember that Kohler fixtures deserve Kohler fittings. Kohler Co. *Founded* 1873. Kohler, Wis.—*Shipping Point*, Sheboygan, Wis. —*Branches in principal cities*. . . . Look for the Kohler mark on each fixture and fitting.

KOHLER OF KOHLER

PLUMBING FIXTURES



—to make hot water systems safe— MUELLER Diaphragm-Operated Water Relief Valves

MUELLER Diaphragm-Operated Water Relief Valve G-9155

Conforming to the A.S.M.E. Boiler Construction Code and approved by the Underwriters

The danger of explosions from high pressure created in water lines is eliminated with the use of Mueller Diaphragm-Operated Water Relief Valves. Set at a pressure below that of the fixture guarantee, they protect range boilers, automatic heaters, water fountains and domestic hot water systems which are otherwise subject to weakening and leaks from high pressure.

These valves are made to Mueller standards of quality and accuracy—famous since 1857. Their cost is indeed low compared to the safety provided. Write for complete information.

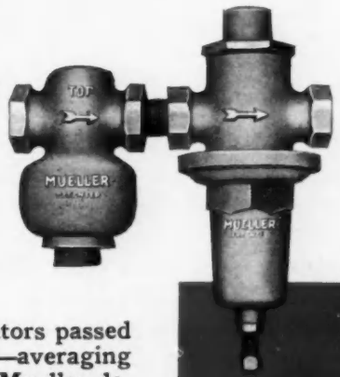
MUELLER

—for protection against high pressure in city mains— MUELLER Pressure Regulators

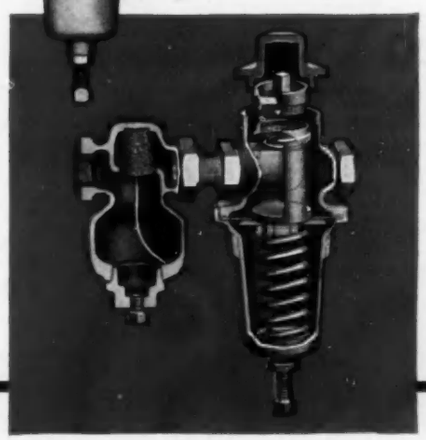
When fire alarms or local conditions call for greater pressure at the pumping station, Mueller Regulators provide ample protection where normal flow is required. Installed on supply lines right after the meters, they prevent water waste, hammering and faucet splashing as well as assuring full volume at fixtures.

In comparative tests, ½" Mueller Pressure Regulators passed as much water as some other makes up to 1¼"—averaging better than twice the capacity! The superiority of Mueller design, the use of virgin metal only, careful workmanship and thorough inspection account for the fact that better than 85% of water works goods carry the Mueller name. Write for complete details.

MUELLER CO. (Established 1857), Decatur, Illinois; Branches: New York, 135th St. and Walnut Ave., Bronx; Chicago, Dallas, Atlanta, San Francisco, Los Angeles; Canadian Factory: MUELLER, Limited, Sarnia.



MUELLER Pressure Regulator G-9000



K3395—New Speakman Anystream Self-Cleaning Shower Head.

LIST PRICE $15.00

(Patented Jan. 2, 1923)

No matter what kind or type of shower is installed this Speakman Anystream Self-cleaning Head should be included

IN addition to being self-cleaning, by means of the lever handle, the new Speakman Shower Head will give a good thorough shower, even with low water pressure.

Also, it enables every person who uses the shower—in residences, hotels, institutions, country clubs, and so forth, to have the shower force each likes best—from a drenching, full-flood shower, to a stinging needle bath.

This new Anystream Self-cleaning shower head (patented) is sponsored by the concern that made the shower the national way of bathing. Literature describing the new revolutionary shower head will be sent promptly.

SPEAKMAN COMPANY, WILMINGTON, DELAWARE

SPEAKMAN
SHOWERS & FIXTURES

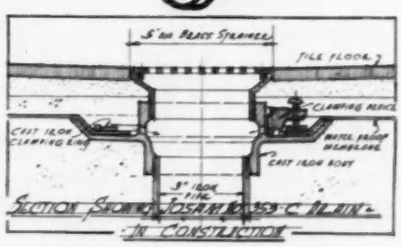
A turn of the lever sluices all sediment away.

Another turn of the lever gives a normal spray.

Here the plungers are set for a forceful needle spray which can be obtained on water pressures as low as ten pounds

And when they decided on the DRAINS

Architects:
Murgatroyd & Ogden, 285 Madison Ave.
New York City
Consulting Architects:
Geo. B. Post & Sons, 101 Park Ave., New York City
General Contractors:
Thompson-Starrett Co. 250 Park Ave., New York City
Plumbing Contractors:
F. B. Lasette, Inc., Long Island City
Roofing Contractors:
Sobel & Kraus., 525 E. 136th St., New York City



Josam came through 100%

Over 500 Josam Drains were installed in the floors, showers and roof of the new Governor Clinton Hotel in New York.

The Josam 300-C, with the clamping device illustrated above, is typical of the numerous double drainage drains installed in the showers of the Governor Clinton.

Josam Catalog G shows the complete line. Have you a copy in your A. I. A. File No. 29 c?

JOSAM MANUFACTURING CO.

Josam Products are sold by all Plumbing and Heating Supply Jobbers

4907 Euclid Bldg., Cleveland, Ohio
Factory: Michigan City, Indiana
Branches in all Principal Cities

SEE OUR CATALOGUE IN SWEETS

There are no substitutes for Josam Products

Josam PRODUCTS

The Josam Line includes: Josam Drains for Floors, Roofs, Showers, Urinals, Garages and Hospitals; Josam Swimming Pool Equipment; Josam-Marsh Grease, Plaster, Dental and Surgical, Sediment and Hair Interceptors; Josam-Grover Floor-Fed, Gas-Fired Garbage and Rubbish Incinerators; Josam Open Seat Back Water Sewer Valves; Josam Open Seat Swing Check Valves; Josam Adjustable Closet Outlet Connections and Bends, Water and Gas-Tight.

EVEN

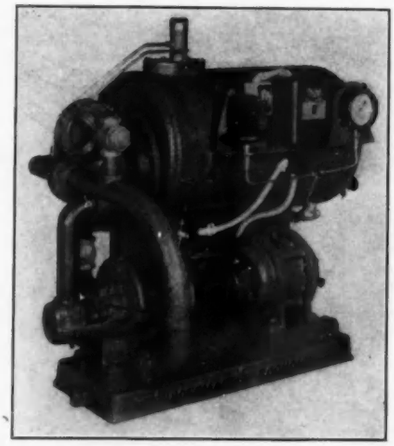
in handling almost-boiling water... Hoffman-Economy Vacuum Pumps *give efficient and Trouble-proof service*

Abnormal conditions may not develop on every heating installation, but to make sure of satisfactory performance, equipment should be selected that allows for all contingencies.

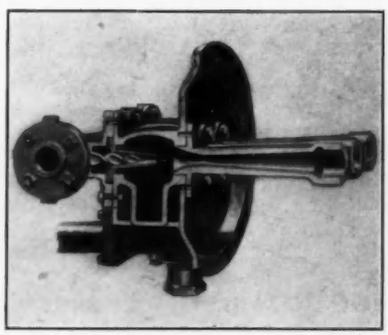
The ability of Hoffman-Economy Vacuum Pumps to handle extremely hot water eliminates one of the most common troubles experienced with such equipment. Positive action in removing air from the system and in returning condensation to the boiler is assured at all times.

The jet type vacuum producer used on Hoffman-Economy Pumps is efficient and trouble-proof. It has no moving parts, never wears out and avoids close clearances on the pump.

Standard Hoffman - Economy Vacuum Pumps "pull" a high vacuum and will operate against 20 pounds boiler pressure. Location of return inlet and float switch close to floor reduces pits and lift fittings to a minimum.



HOFFMAN ECONOMY VACUUM PUMPS



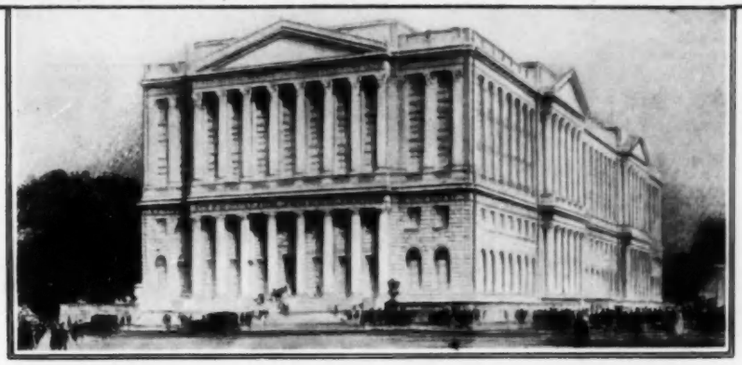
Other types of Hoffman-Economy Pumps are: Horizontal Condensation Pumps, Reciprocating Pumps, Vertical Underground Pumps and Air Line Vacuum Pumps. All units are sturdily constructed, mounted on heavy cast iron base and equipped with motors of standard make and size. Write for complete information. Hoffman Specialty Company, Inc., Dept. EF-19, Waterbury, Conn.

For complete technical information on all Hoffman Heating Equipment, see Sweet's Catalogue, pages D-4815 to D-4874.

* * *

Hoffman-Economy jet type vacuum producer is the simplest and most dependable method for exhausting air and vapor from heating systems.

MEETING ARCHITECTURAL STANDARDS OF QUALITY



Mutual Benefit Life Insurance Company Building, Newark, N. J., John H. and Wilson C. Ely, Architects. Solid Nickel Silver plumbing fixtures by The Meyer-Sniffen Co., New York.*

MODERN BUILDINGS DESERVE MODERN FIXTURES OF NICKEL SILVER

SEMI-INSTITUTIONAL structures such as the new Mutual Benefit Life Insurance Company Building in Newark, N. J., are built to endure for generations. Every detail in their construction must conform to the highest standards of architectural quality. It is significant, therefore, that the builders selected Solid Nickel Silver* plumbing fixtures manufactured by Meyer-Sniffen... Solid Nickel Silver possesses a characteristic hardness that adds to the wear-resistance of valve seats. Its permanent, silver-like lustre compares favorably with the appearance of Pure Nickel and other high Nickel alloys. It is easy to keep clean and spotless even when subjected to severe use ...The specification of Solid Nickel Silver sanitary equipment is the logical way to insure beauty, permanence and highest quality. For the most modern type buildings, plumbing fixtures of Solid Nickel Silver have no substitute.

18% 22 Nickel SILVER

[*Diamond Metal is the name used by The Meyer-Sniffen Co. to identify its Nickel Alloy used in manufacturing Nickel Silver plumbing fixtures. This is a solid white metal and contains a high percentage of Nickel.]

THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL STREET, NEW YORK, N. Y.

The Endowment

MOORE LABOR

Wisely Pro

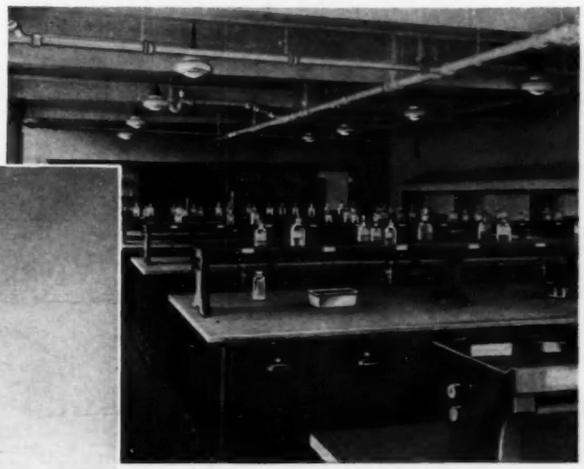
The Moore Foundation for the establishment of the Laboratory of Chemistry at Amherst College carried the stipulation that quality should prevail throughout. This alone would insure the permanency that has been the keynote of Amherst teachings for over a century.

McKim, Mead & White, Architects.

Which Created the

ORATORY OF CHEMISTRY

vided for Leak-proof Drains



One of the laboratories, showing Duriron drain piping hung from the ceiling.

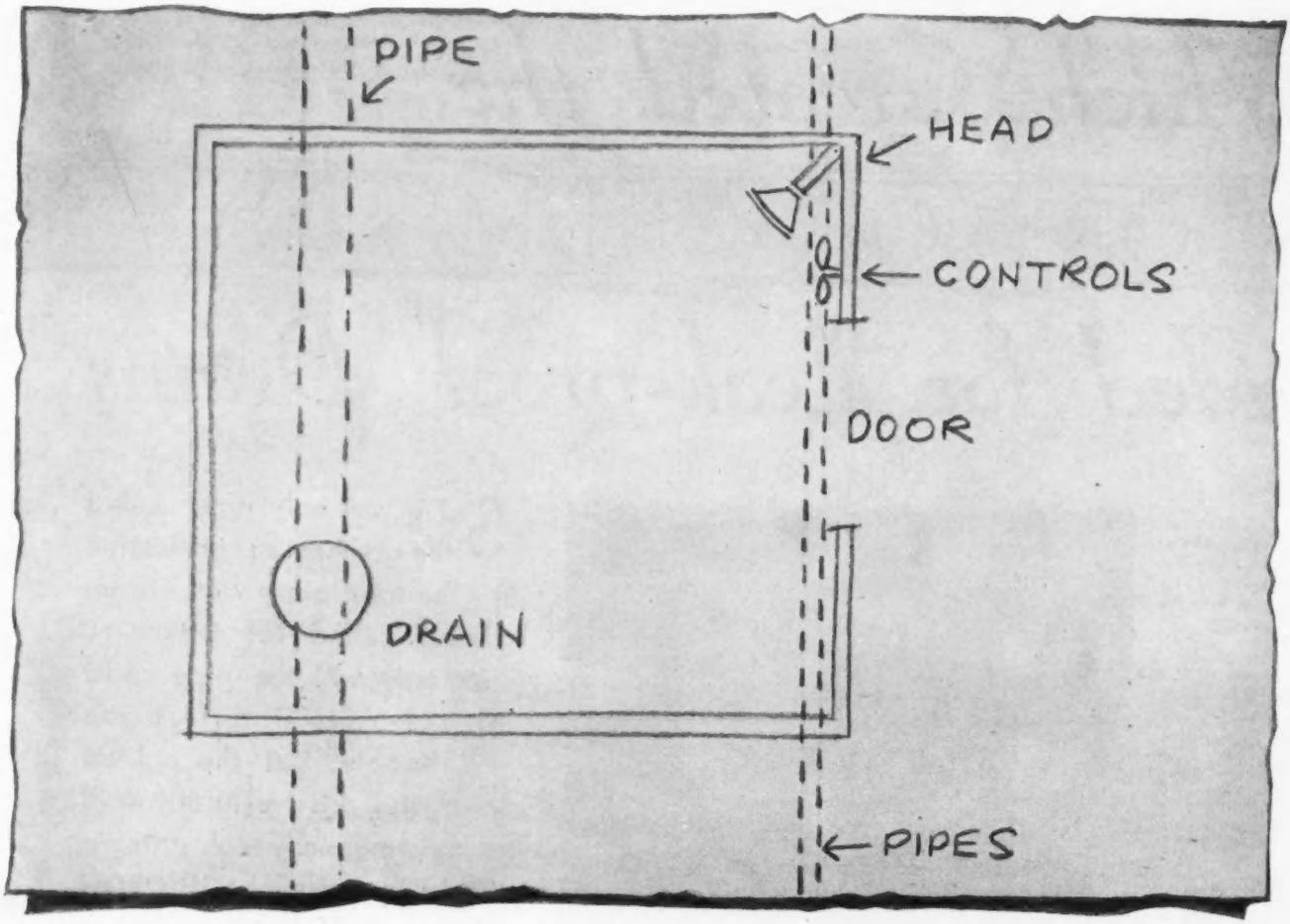
Tenny & Ohms, Engineers.

SO it was only natural that the architect's specification for the laboratory waste drain piping called for DURIRON. Not only will the pipe resist all corrosive deterioration indefinitely, but the calked joints, too, are structurally rigid and permanently leak-proof—the latter a definite DURIRON advantage.

The choice of DURIRON is paid-up insurance against building damage due to the leakage of corrosive liquid wastes. It is an ultimate economy. For 17 years a product of The Duriron Co., Inc., Dayton, Ohio.

DURIRON ACID PROOF DRAIN-PIPE

D-42



This Pencil Sketch Made 1,000 Men Cleaner and Happier

Industry everywhere is rapidly swinging to the modern common-sense idea that workers' cleanliness, happiness and health must be zealously guarded in the plant.

For just this reason a large eastern company decided upon a new factory shower bath installation. A Clow Soldier of Sanitation was called in.

His answer was this rough pencil sketch. The ultimate result is an installation that gives the factory's 1,000 men shower facilities that the finest homes cannot equal for sheer practicability.

The shower head is located in a corner to gain the maximum spray area in a minimum space.

Spray is directed against a wall instead of a flimsy door curtain.

Controls are located just inside the door to end reaching through an icy or scalding deluge to adjust water temperatures.

These are simple things. But they help to illustrate how the Clow Soldier of Sanitation does not come in to you merely to show pictures in a catalog. His job is to help you fight ill-health, discomfort, insanitation, pollution and disease.

And to help you achieve this end with the very minimum through-the-years cost.

At his finger tips is the sum total of Clow's 52 years specialized experience—at his back the most complete line of specialized fixtures in the world.

The Clow Soldier of Sanitation is your natural ally on every building job where sanitation is likely to be an acute problem: schools, hospitals, industrial plants, public buildings and the like. Call him in. "Wally." Van B. Claussen, 47 W. 34th St., New York City.

CLOW

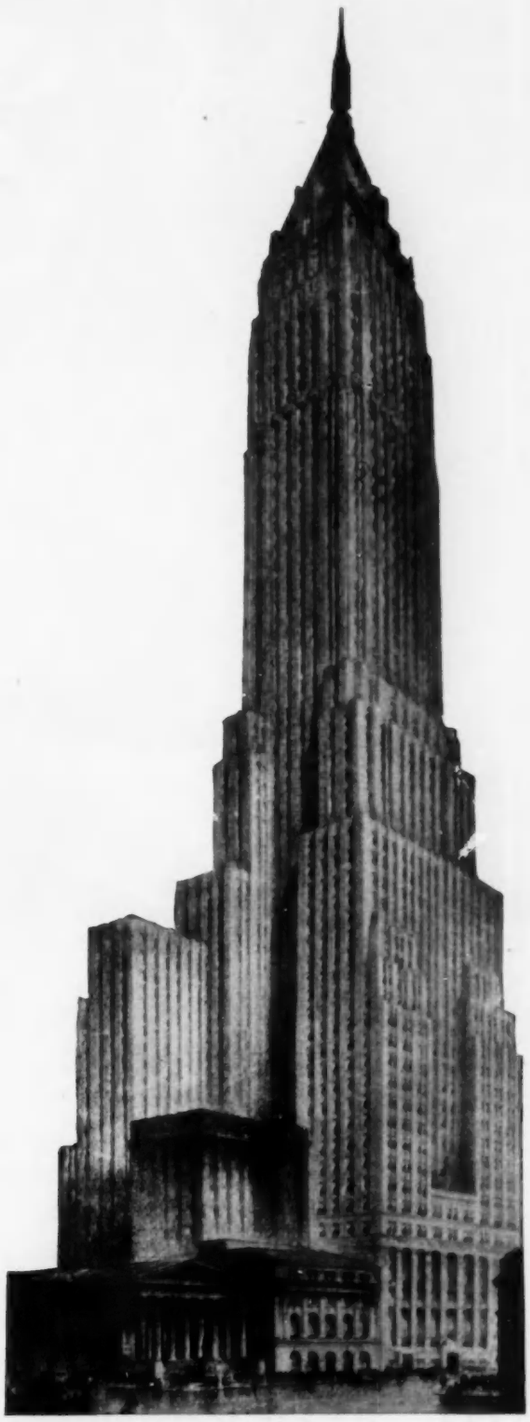
CHICAGO

PREFERRED FOR EXACTING PLUMBING SINCE 1878

Specify

WALWORTH
VALVES
FITTINGS
AND TOOLS
for

PLUMBING
AND
HEATING



● In the Bank of Manhattan Building, Walworth furnished the valves for the heating installation, the hose valves, and all of the fittings for the fire protection system. ● Walworth valves and fittings likewise are a part of the mechanical equipment of many of the newest and largest buildings in New York City. ● Leading architects and engineers are specifying Walworth products for their major building jobs.

THE BANK OF THE MANHATTAN CO. ● New York
Architect and Consulting Engineer: H. Craig Severance
Associate Architect: Yasuo Matsui
General Contractor: Starrett Bros.
Plumbing Cont.: W. G. Cornell Heating Cont.: Baker, Smith & Co.

WALWORTH COMPANY
General Sales Offices: 60 East 42nd St., New York
Plants at Boston, Mass.; Kewanee, Ill.; Greensburg, Pa. and Attalla, Ala.
• DISTRIBUTORS IN PRINCIPAL CITIES OF THE WORLD •

WALWORTH

VALVES - FITTINGS - AND TOOLS

SUBJECT TO HIS APPROVAL

Time—That Tough Old Tester of everything in this world—writes the final "Okay" on the materials that make up any structure.

For Time alone can tell whether those materials are worthy—serving faithfully through the years, or causing trouble and expense long before completing their expected life-span.

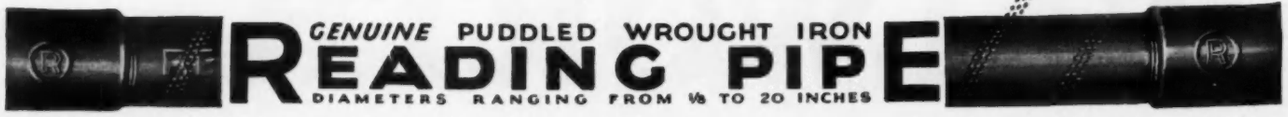
In the important matter of piping, so vital to permanence, Time has spoken clearly. His verdict—today as eighty years ago—is Genuine Puddled Wrought Iron for lasting pipe economy and satisfaction. No other pipe material has proved so successful in withstanding all the attacks of Time and his destructive henchmen—corrosion, vibration, leaky joints and the rest.

Use only Reading 5-Point Nipples with Reading 5-Point Pipe—you'll know them by the indented spiral band

Reading 5-Point Pipe is made of Genuine Puddled Wrought Iron, that rust-resisting, strain-defying metal of the ages. That is why you can specify Reading 5-Point Pipe with the confidence that it will outlast ordinary pipe two to one, and probably five to one!

READING IRON COMPANY, Reading, Pennsylvania

For Your Protection, This Indented Spiral Forever Marks All

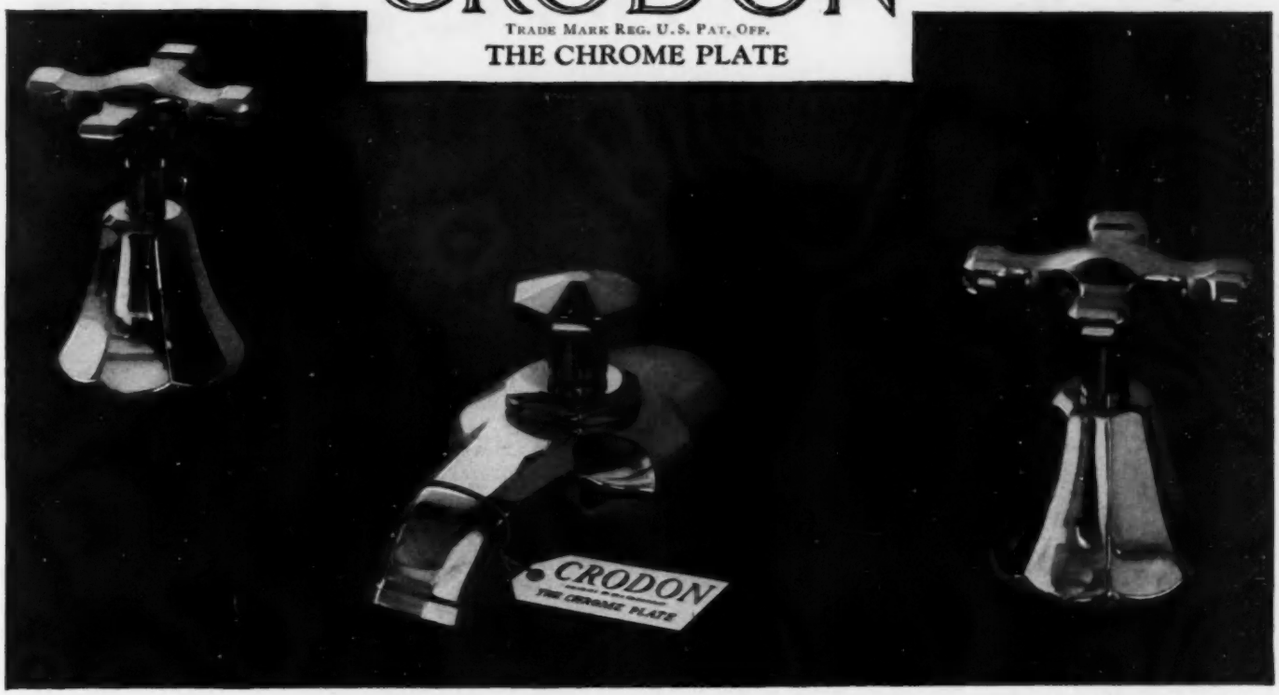


Science and Invention Have Never Found a Satisfactory Substitute for Genuine Puddled Wrought Iron

CRODON

TRADE MARK REG. U.S. PAT. OFF.

THE CHROME PLATE



Fixtures by CRANE

A SAFEGUARD that assures the finest Chromium Plate . . .

When you specify chromium plated equipment, consider the value of the protection provided by CRODON.

CRODON is produced by a highly developed and consistently successful process of chromium plating . . . a process used only by manufacturers of quality plumbing fixtures and building hardware. These manufacturers exercise exceptional care in safeguarding the uniformity and dependability of the chromium plate they apply to their products.

So if you specify CRODON, you can rest assured that the specification will be met by quality products. Have you a list of the manufacturers using CRODON? We will gladly send you one, for the asking.

Branch Offices and Plants:
Chicago, Cleveland, and Waterbury, Conn.

CHROMIUM CORPORATION OF AMERICA

Licensees of

UNITED CHROMIUM, INC., 51 East 42nd Street, New York

TESTED IN

Also certified under operating conditions

To guarantee reliability under operating pressure and temperature, each trap is tested and certified by an engineer of the Pittsburgh Testing Laboratory. He affixes a certificate tag to each trap which passes his test.

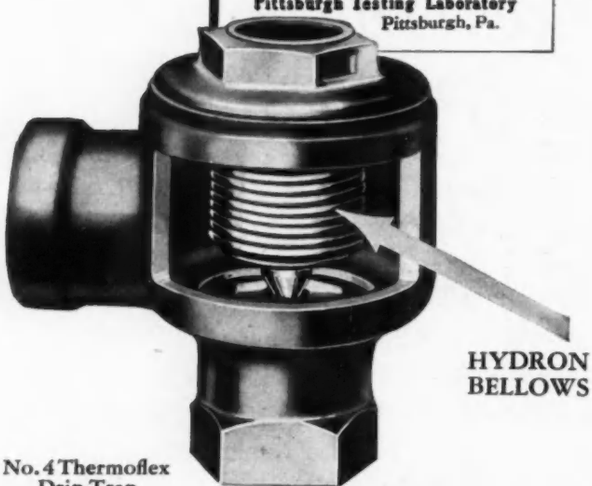
Certificate of Inspection

This is to Certify that this

Thermoflex

product has been individually inspected and tested by us, and that this tag is affixed by our engineer as denoting approval in accordance with test requirements outlined on the reverse side of this certificate.

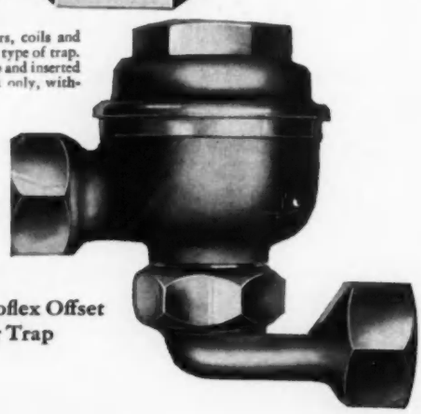
Pittsburgh Testing Laboratory
Pittsburgh, Pa.



HYDRON BELLOWS

No. 4 Thermoflex Drip Trap

For dripping mains, risers, coils and unit heaters, we offer this type of trap. Cast-iron body, bronze cap and inserted bronze seat, angle pattern only, without unions.



No. 3 Thermoflex Offset Radiator Trap

Thermoflex TRAPS

Each Hydron bellows in Thermoflex steam traps is made by internal pressure, which tests its structure infallibly.

If there were the slightest weakness anywhere in its structure the bellows would be destroyed.

Do you know of any device which would be *ruptured and destroyed* while it was being made?

In the Thermoflex trap, the trap with the Hydron bellows, you have a guarantee of strength for each trap on each radiator far beyond any demands in actual use.

Thermoflex is a Hydron *Bellows* Trap

The heart of the Thermoflex trap is the Hydron bellows. This scientifically designed, tested-in-the-making trap is a *proved* trap. It will open and close the drain orifice millions of times a year with *no* signs of giving out. The Hydron bellows is in every Thermoflex radiator trap, drip trap, offset trap, and high pressure trap.

The one trap that meets Grinnell standards

Grinnell Company has discovered in Thermoflex the trap that meets its own exacting standards. It is a discovery of great importance because never before could a trap be pre-tested in its making.

The bellows type trap is the most practicable, the longest-lived trap.

Write for detailed information regarding Thermoflex Traps. Use the coupon on the opposite page.

GRINNELL

Executive Offices: Providence, R. I.

THE MAKING

Grinnell Company is the exclusive distributor for Thermoflex traps. Years of unfailing service in all types of buildings and under severe and varied conditions have proved their unfailing value, their uniformly high quality, their long efficient service.

Let our sales engineers work with you to insure permanent satisfaction.

No. 100 Thermoflex High Pressure Trap
For pressures up to 125 pounds.

No. 12 Thermoflex Radiator Trap
Body is extra heavy throughout, using a brass forging for the cap and spudnut, highest grade cast brass for the body and spud.

COMPANY

Branches in all Principal Cities

GRINNELL COMPANY, INC.
316 W. Exchange St., Providence, R. I.

I want to read more facts about Thermoflex Traps. Send along your data booklet giving capacities and dimensions.

Name_____

Title_____

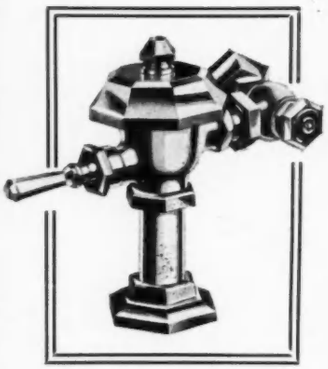
Firm Name_____

Address_____

PARK PLAZA APARTMENTS

St. Louis, Mo.

Associated Architects: Laurence O. Schopp & Edwin J. Bauman
Owners and Builders: Park Plaza Co.
Sam Koplar, President; Nat Koplar, Vice-President
Plumbing Contractors: J. A. McBride Mechanical Equip. Co.
Plumbing Jobbers: N. O. Nelson Mfg. Co.



Equipped Throughout with the

Watrous

Art Crodon Flush Valve and Colored Wall Closet Bowls

AN Installation of over 500 of these flush valves has been placed in the Park Plaza Apartments, to assure conformity with the grace, beauty and efficiency of the other bathroom fixtures.

Write for details to

THE IMPERIAL BRASS MANUFACTURING COMPANY

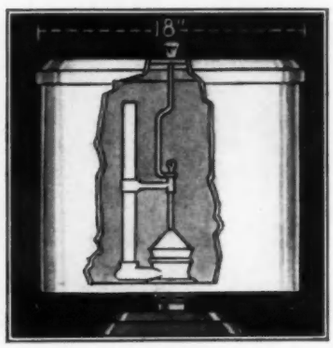
1238 West Harrison Street CHICAGO

BRANCH SALES OFFICES IN ALL PRINCIPAL CITIES

Lambertville TOP-LIFT

Investigate These 5 Features

1. Positive Action.
2. Cannot Stick.
3. No lever to interfere with toilet seat.
4. A "lock-on" cover to prevent accidental breakage.
5. Space saver—tank is only 18" wide including cover but has the same water capacity as a larger tank due to elimination of side-action lever.



Made of vitreous china and attractively priced. Sold separately or in combination with bowl. Complete details and prices on request.

LAMBERTVILLE POTTERY CO.

LAMBERTVILLE, N. J.

DIVISION OF PIERCE BUTLER & PIERCE MFG. CORP.

EXPAN-HUB SOIL PIPE

Here—at last—is a soil pipe made to meet the demands of Modern Buildings. For its *specially designed gasket* completely eliminates the troubles caused by the expansion and contraction of soil, waste and vent lines.

The Solution of Expansion Difficulties

And Expan-Hub is made better throughout: *Extra thickness at the hub adds strength* and permits caulking without breakage, this thickness tapering down into the pipe proper.

Quality and thickness of material run more uniform throughout the entire length of pipe—making it easier to work.

Manufactured and sold by

ALABAMA PIPE COMPANY STRINGER BROS. CO., Inc.
ANNISTON FOUNDRY CO. THE WETTER PIPE CO.
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COPPER
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IRON

PIPE

FOR PERMANENCE

REPUBLIC IRON & STEEL COMPANY, YOUNGSTOWN, OHIO

Pipe *for* Permanence·

You might think this an appeal—or perhaps a pipe of different character—or the title of a book. As a matter of fact, it is all of these.

Modern engineering practice now requires that you Pipe for Permanence—with Toncan Iron Pipe—and, if you don't know what Toncan is, you can read all about this longer life alloy iron pipe in the book bearing the title "Pipe for Permanence." This new and interesting book should be in the reference library of every architect, engineer, plant superintendent, purchasing agent, technical school—wherever pipe is bought, used or specified for any kind of service. Just a simple exposition of the latest contribution of Science to overcome "This Pipe Problem"—and there's a copy for you all ready to mail upon receipt of your request.

REPUBLIC IRON & STEEL COMPANY

YOUNGSTOWN, OHIO

Birmingham Boston Buffalo Chicago Cincinnati Cleveland Dallas Denver Detroit El Paso Los Angeles New York Philadelphia Pittsburgh San Francisco Seattle St. Louis

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IRON PIPE

As Protection to You, We Mark It BLUE

By Permission of the New York Stock Exchange Building Company

Veneer-Steel
TRADE MARK REG.

IN OFFICE STRUCTURES PARTICULARLY

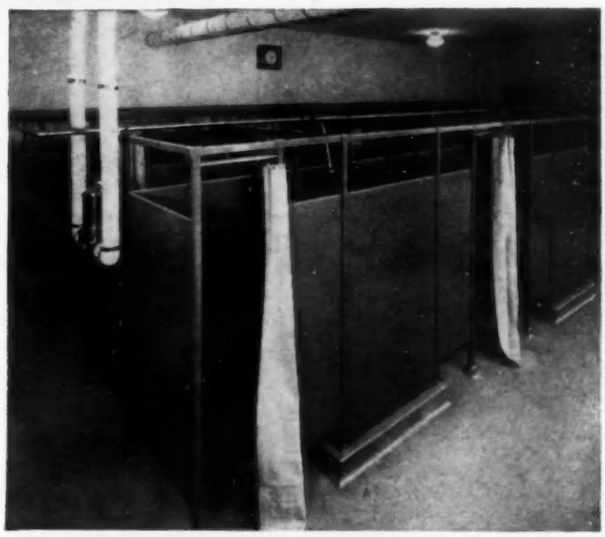
Veneer-Steel sound-proof doors on partitions of marble, structural glass, etc., have found great acceptance in office structures. The hinge used is the famous Hart & Hutchinson ball-bearing gravity type—proved insurance of trouble-proof performance.

. . . DEPENDABILITY HAS BEEN PROVED

VENEER-STEEL Partitions for toilets, showers, dressing rooms—for ward screens and dwarf partitions in hospitals—have thoroughly established their dependability. Here are partitions that will stand up against rough use, time, hot and cold water, and excessive temperature changes.

Veneer-Steel Partitions and Doors are rust-proof, noiseless, non-absorbent and flush-type. They are built of *galvanized* sheets overlaid on a fibre core and cemented thereto with all edges soldered. All posts and wall attachments are sherardized inside and out after fabrication.

Hardware solid white brass buffed bright or pressed brass chromium plated. Because Veneer-Steel Doors and Partitions are solder sealed they are impervious to moisture and cannot absorb or retain odors. Standard finishes for Veneer-Steel Partitions and Doors are olive green and grey. Special finishes and wood grains can also be supplied.



CONCERNING GALVANIZING

W. T. Flanders of the Malleable Iron Fittings Co. says in his book: "GALVANIZING and TINNING"

"IT has not yet been discovered how to regenerate steel. Until such a discovery is made we are compelled to resort to embalming.

"The metallic method of embalming consists of coating the steel with some other metal, and zinc is without doubt, the best protective coating for iron and steel."

Veneer-steel Partitions and Doors are galvanized.

Complete details found in Sweet's or send for bulletins

THE HART & HUTCHINSON COMPANY

BRANCHES IN NEW YORK CITY, PHILADELPHIA AND BOSTON
FACTORY—NEW BRITAIN, CONN. . . AGENTS IN OTHER PRINCIPAL CITIES

NEW JERSEY'S TALLEST

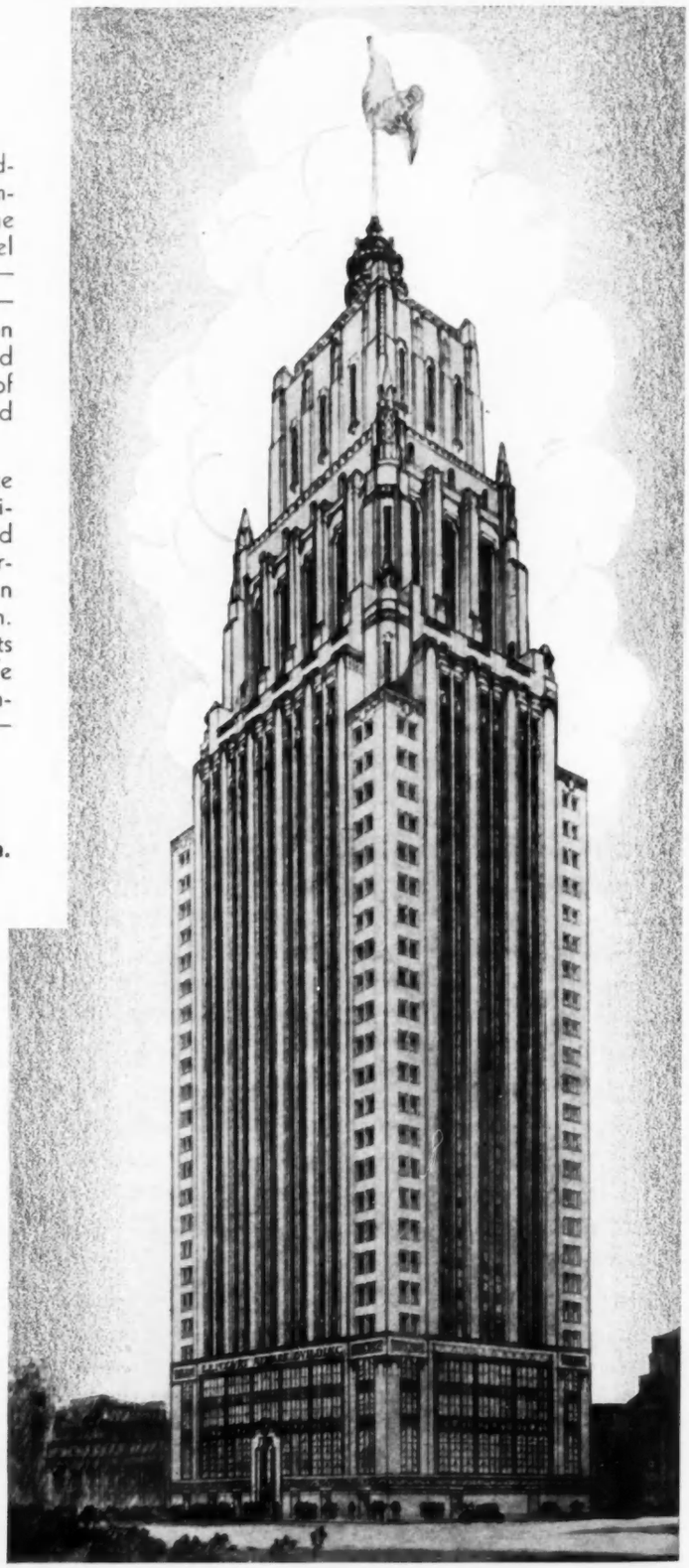
LEFCOURT-NEWARK BUILDING, NEWARK, N. J.
Architect: Frank Grad, Newark, N. J.
Engineer: Eadie, Freund & Campbell, New York City
Plumbing Contractor: Jaehnig & Peoples, Newark, N. J.
Heating Contractor: Schrenell Bros., Newark, N. J.

Unusually effective in interior plan with its commanding and graceful exterior lines, this recently completed building ranks with some of the finest in the land, a structure of which New Jersey may well feel proud. Thirty-seven stories from street to tower—the highest building in the State of New Jersey—the Lefcourt-Newark Building is the latest addition to Newark's skyline. Naturally the architects and engineers, experienced in specifying for some of America's finest buildings, turned to time-tested and quality-proven material.

Thus, as in many previous instances, they chose NATIONAL for the major pipe tonnage. In addition to NATIONAL Pipe for the heating, soil and waste lines, they specified NATIONAL Copper-Steel Pipe for the vent lines and rain leaders as an additional protection against atmospheric corrosion. Many years of experience and numerous service tests have proven that copper-steel pipe gives added life to those lines exposed to alternate wet and dry conditions. Write for Bulletin No. 11, describing—

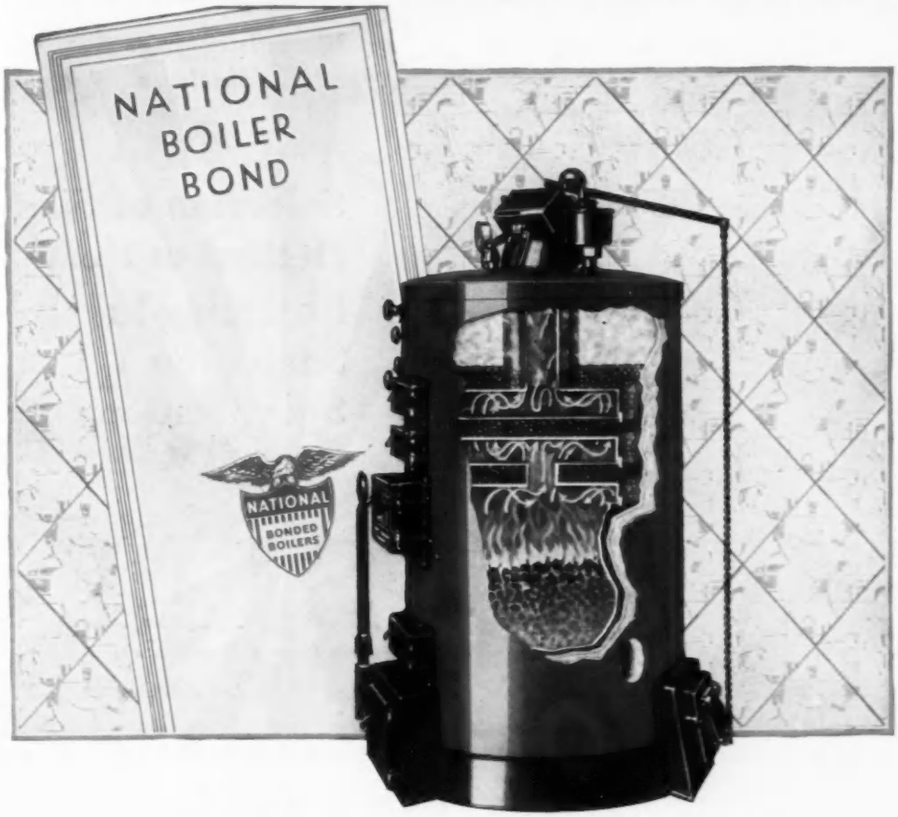
NATIONAL COPPER-STEEL PIPE
The Original Copper-Steel Pipe

NATIONAL TUBE COMPANY—Pittsburgh, Pa.
Subsidiary of United States Steel Corporation



NATIONAL PIPE

THERE'S A NATIONAL HEATING SYSTEM FOR EVERY BUILDING NEED



Cutaway view National Crimson Flame Boiler. One of 118 types and sizes.

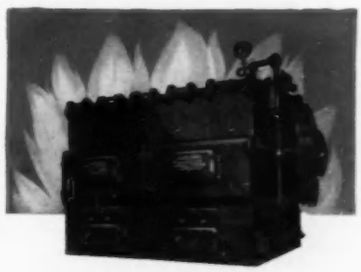
National Novus Boiler

National Bonded Crimson Flame Boiler

Mushrooms of Flame Bloom Against Each Section

Zig-zagging in and out, the flaming gases take their serpentine way to the stack. They pass through scientifically proportioned, water-surrounded ports, and "mushroom" out over the entire bottom of the section above, before escaping through its ports. The Crimson Flame dependably, efficiently furnishes the flood of friendly warmth which its crimson jacket so vividly promises.

This boiler is designed to perform efficiently with all leading types of fuel; coal, coke, oil and gas. It can be converted on the ground to meet the individual requirements of the fuel selected. Engineering design scientifically coordinates every part to produce economical combustion and thoroughly satisfactory heating. The National Boiler Bond, furnished with each boiler, not only guarantees workmanship, materials, and design, BUT MOST IMPORTANT OF ALL SPECIFIES AND GUARANTEES BOILER PERFORMANCE. We will gladly send additional information.



National Low Water Line Boiler

National Super-Smokeless Boiler

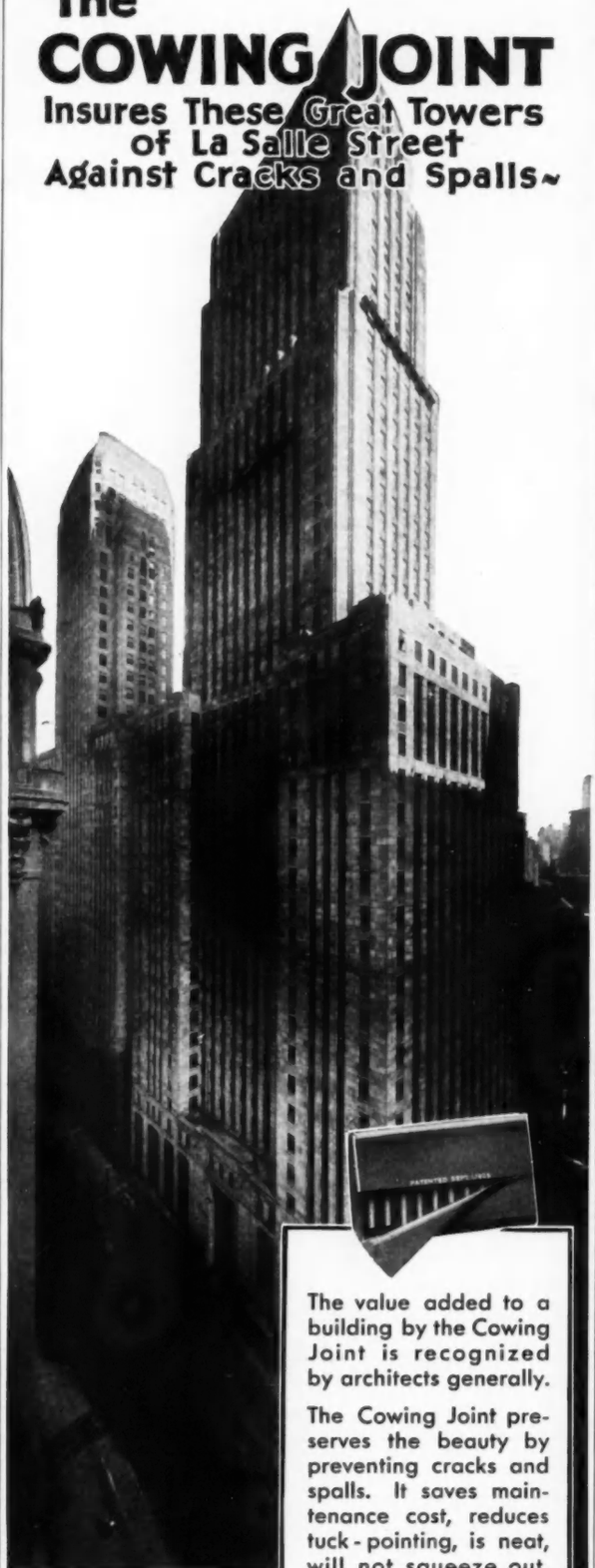
NATIONAL RADIATOR CORPORATION
JOHNSTOWN, PENNSYLVANIA

NATIONAL *Made-to-Measure* HEATING SYSTEMS

Copyright 1930—Nat. Rad. Corp.

The COWING JOINT

Insures These Great Towers of La Salle Street Against Cracks and Spalls~



The value added to a building by the Cowing Joint is recognized by architects generally.

The Cowing Joint preserves the beauty by preventing cracks and spalls. It saves maintenance cost, reduces tuck-pointing, is neat, will not squeeze out, it endures.

See "SWEETS"

ONE LA SALLE STREET
K. M. Vitzthum & Co., Arch.
FOREMAN BANK BUILDING
Graham, Anderson, Probst and White, Architects

Cowing Pressure Relieving Joint Co.
226 W. Superior St. Chicago, Illinois

Hospital Sterilizers

Consultation and engineering service on sterilizer installations

Selection of Sizes
Method of Heat
Roughing-In
Sanitation
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World's Largest Line of Sterilizers

Wilmot Castle Co., 1209 University Ave., Rochester, N. Y.

More Practical Industrial Buildings

INDUSTRIAL buildings make use of every proved aid to increased earnings and reduced costs. That more and more plans of industrial projects specify Standard Conveyors is evidence of their necessity in practically all kinds of business.

STRONG construction and constantly reliable service are built in every Standard belt, slat or roller conveyor (power or gravity). Write for a complete file of Standard literature. It's certain you will often have occasion to use it.

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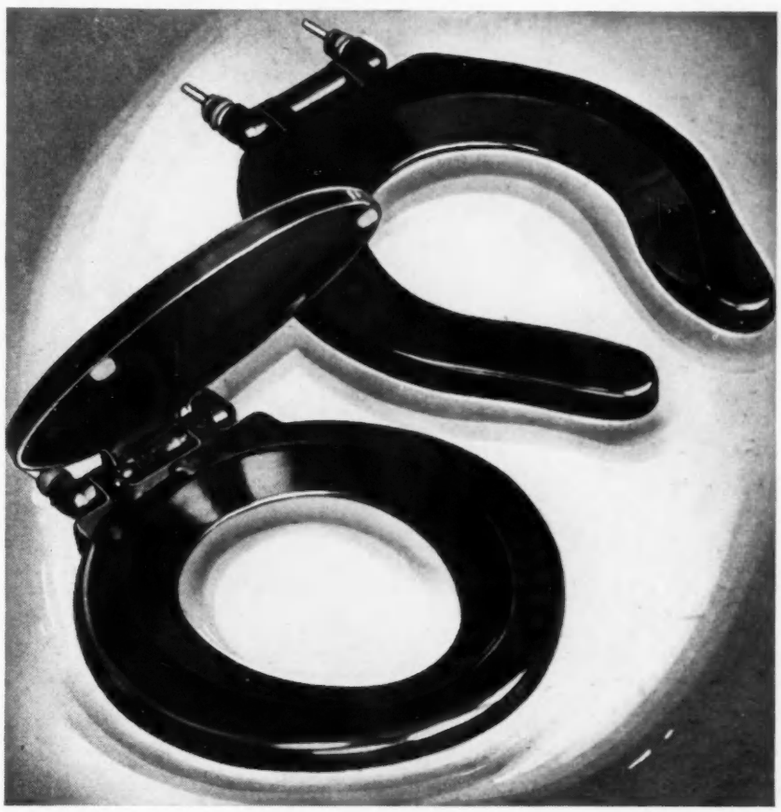


MOLDED IN ONE SOLID, SEAMLESS PIECE —NO EXPOSED METAL FITTINGS

With a hard, glossy smooth surface that is as easily washed as a china dish, Bakelite Molded is a most sanitary material for toilet seats. In addition it has the advantage of being stain-proof and non-inflammable, and so strong that there is little or no chance of splitting, warping or chipping.

Bakelite Molded seats are installed in many important buildings, among them being the State Bank of Chicago, Graham, Anderson, Probst & White, Architects, and the Chicago Medical and Dental Arts Building, D. H. Burnham & Co., Architects. These seats are available in types suited for Hotels, Office Buildings, Factories and Homes, and are made by the San Duro Mfg. Co., Rockford, Ill.

Bakelite Materials are also used for other building equipment including switch and outlet plates, doorknobs and escutcheons, floor plates, lighting fixtures and paneling and trim.

Write to us for a full list with the names of manufacturers.

BAKELITE CORPORATION, 247 Park Avenue, New York. CHICAGO OFFICE, 635 West 22nd Street

BAKELITE CORPORATION OF CANADA, LIMITED, 163 Dufferin Street, Toronto, Ontario

BAKELITE

REGISTERED U. S. PAT. OFF.

"The registered Trade Mark and Symbol shown may be used only on products made from materials manufactured by Bakelite Corporation. Under the copyright "B" is the numerical sign for infinity, or unlimited quantity. It symbolizes the infinite number of present and future uses of Bakelite Corporation's products."

THE MATERIAL OF A THOUSAND USES

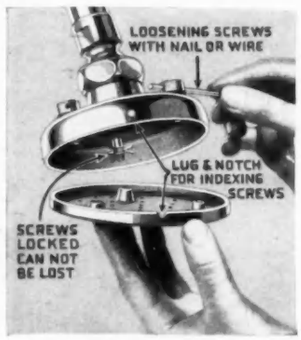
NIEDECKEN

Niedecken Shower Face is radially drilled furnishing the usual generous shower spray with less water: a valuable economy feature

Niedecken Mixer, for shower and tub, is recognized the world over as the foremost in design, construction and efficiency

Positively Leak Proof Shower Stall

Niedecken Shower Stall is made of a continuous 1/8 inch copper bearing steel—which, with the riser, is welded to the bottom: making it positively leak-proof for all time.

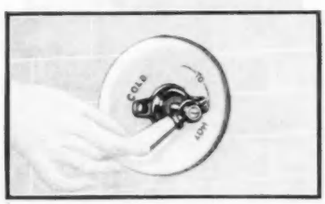


Easy Clean Shower Head

Face of shower head completely removed by simply loosening three screws. After cleaning, face is replaced—a set of notches guiding for correct placement and alignment as when originally assembled.

PATENTED MIXER . . . CONTROL

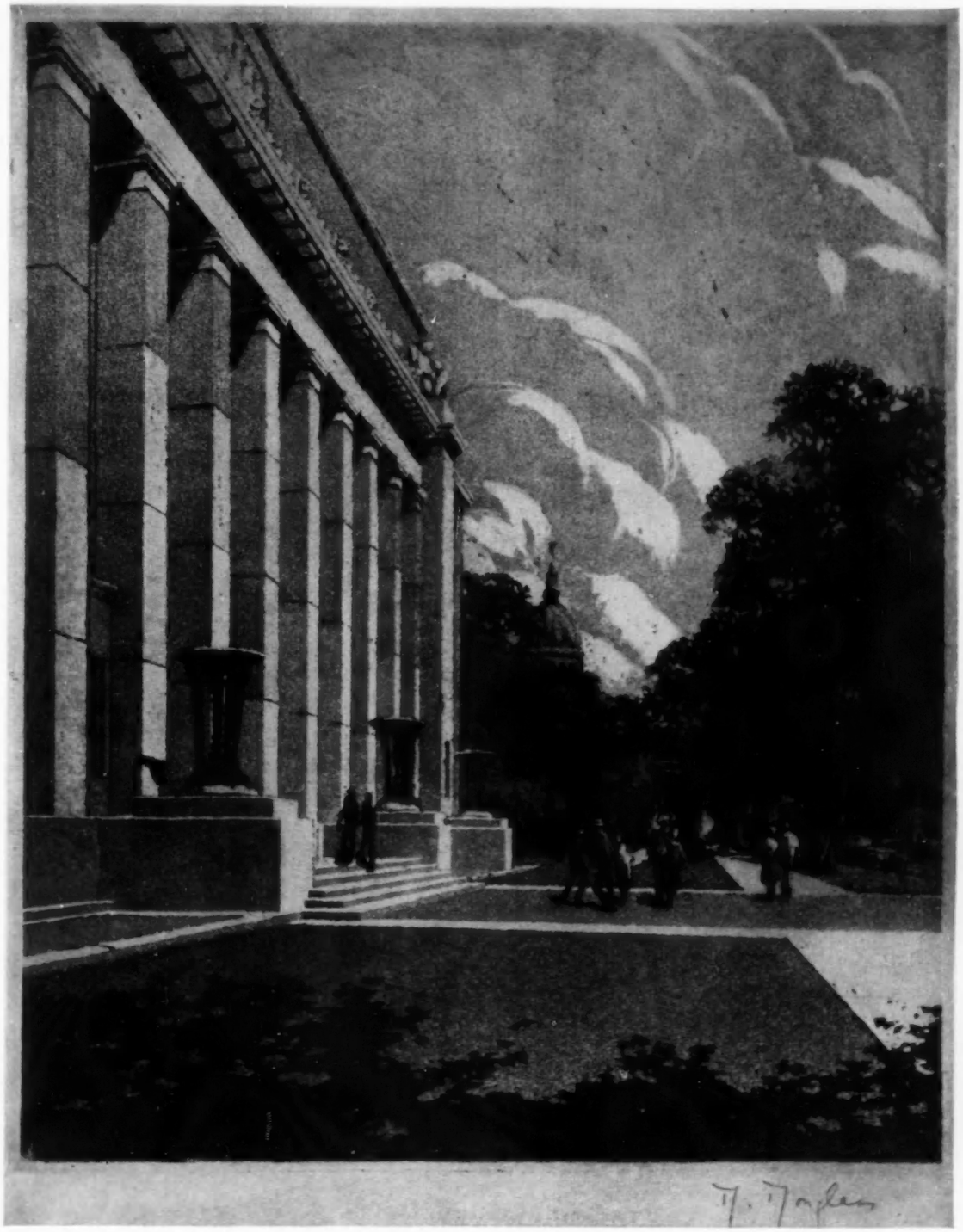
Patented mixer control, for shower or tub, provides a predetermined maximum hot water temperature. This prevents scalding, and also the waste of water as in ordinarily obtaining the correct water temperature. Also, one valve operates the mixer instead of two, as ordinarily used. Write now for details: acquaint yourself with this new bath advancement, for your own information and the benefit of your clients.



Write for Complete Details Now

Write now for complete details regarding Niedecken Shower and Tub Fixtures and Niedecken Features of unequaled advantages. Have Niedecken in your files—and Niedecken in your mind for the most advanced bath equipment improvements.

HOFFMANN & BILLINGS
. . . . . MFG. CO.
202 BECHER STREET
MILWAUKEE
WISCONSIN



An aquatint study of the Hartford County Building, Hartford, Conn. ⌒ Paul P. Cret and Smith & Bassette, Philadelphia, Associated Architects ⌒ I. H. Francis, Philadelphia, Mechanical Engineer ⌒ E. J. Pinney Co., Springfield, Mass., General Contractor ⌒ Libby & Blinn, Hartford, Heating Contractor ⌒ Otto Epstein, Hartford, Plumbing Contractor . . . Jenkins Valves serve in both the heating and plumbing of this modern public building. . . . Jenkins Bros. ⌒ 80 White Street, New York ⌒ 524 Atlantic Avenue, Boston ⌒ 133 North 7th Street, Philadelphia ⌒ 646 Washington Blvd., Chicago . . . Jenkins Bros., Limited ⌒ Montreal ⌒ London.

Always marked with the Diamond
Jenkins Valves
SINCE 1864

KNIGHT-WARE
"IT IS THE BODY ITSELF"

Chemistry Buildings at these institutions are equipped with KNIGHT-WARE

PRINCETON UNIVERSITY
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PENN STATE COLLEGE
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Specify
KNIGHT-WARE
Waste and Drain Lines
Ventilating Ducts
Laboratory Sinks
Sumps and Catch Basins
Ventilating Flue Caps

If the following facts interest you—

Economical Initial Cost—
KNIGHT-WARE costs less than most acid proof materials. Your initial cost is your LAST cost.

Economical Installation Cost—
KNIGHT-WARE is easily and economically installed. Waste and Ventilating Pipe and Fittings are hung in much the same manner as ordinary materials. Joints are easily packed and result in permanent leak and acid proof connections.

Permanency—
Positively unaffected by acids, alkalies, chemicals or corrosive solutions and gases and highly resistant to abrasion, there is no wear-out in KNIGHT-WARE. *It lasts the life of the building.*

Consult us.

MAURICE A. KNIGHT

OFFICE AND PLANT
AKRON, OHIO

New York City, 804 World Building
Philadelphia, 1600 Arch Street
San Francisco, Merchants Exchange Building
Niagara Falls, 309 United Office Building
Montreal, Que., 1307 Notre Dame Street, West

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- *SUITABILITY*
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For loads of less than a pound to more than a ton various types and arrangements of Sedgwick Dumb Waiters and Elevators are designed to give efficient, satisfactory and economical service.
Our Architects' Service Department is maintained to assist you in the selection of equipment most suitable to the individual requirements of service.

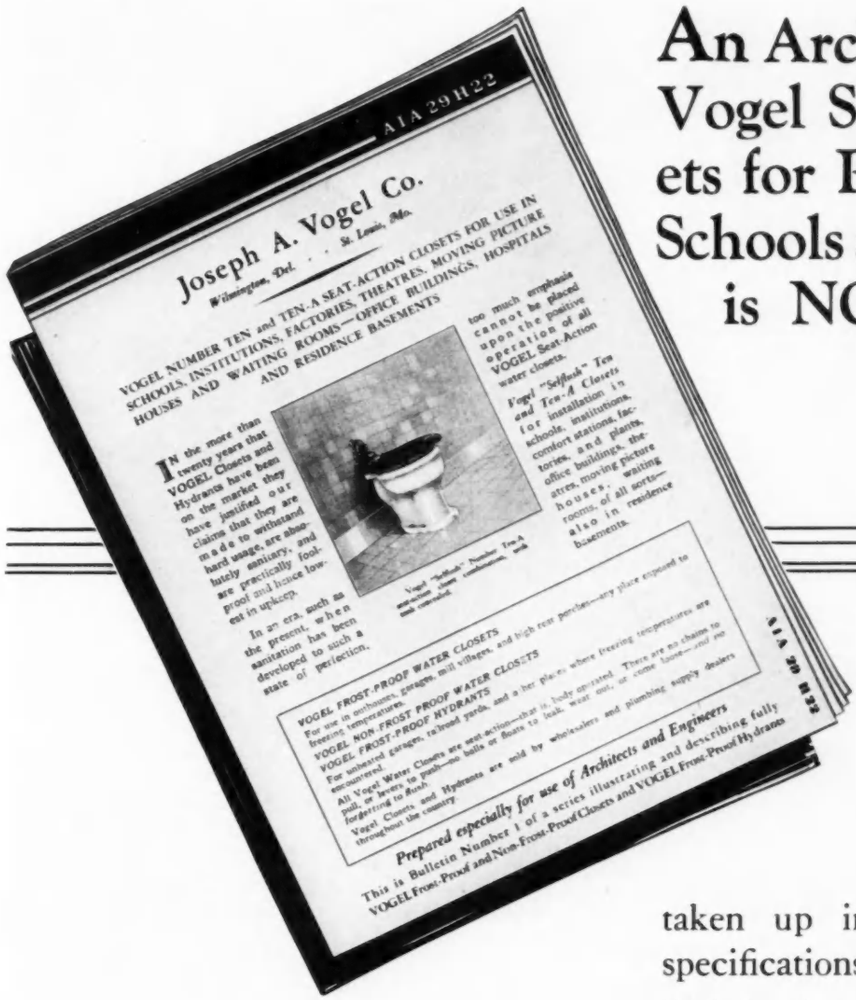
Write to SEDGWICK MACHINE WORKS
151 W. 15th Street, New York

SEDGWICK
Dumb Waiters - Elevators
FOR ALL PURPOSES

Otis — The World's Word for Elevator Safety

There are now 1723 Otis Signal Control Elevators in service or contracted for

Signal Control is an exclusive development of the Otis Elevator Company


A I A 29 H 22
Joseph A. Vogel Co.
Wilmington, Del. St. Louis, Mo.
VOGEL NUMBER TEN and TEN-A SEAT-ACTION CLOSETS FOR USE IN SCHOOLS, INSTITUTIONS, FACTORIES, THEATRES, MOVING PICTURE HOUSES AND WAITING ROOMS—OFFICE BUILDINGS, HOSPITALS AND RESIDENCE BASEMENTS
IN the more than twenty years that VOGEL Closets and Hydrants have been on the market they have justified our claims that they are made to withstand hard usage, are absolutely sanitary, and are practically foolproof and hence low-cost in upkeep.
In an era, such as the present, when sanitation has been developed to such a state of perfection, too much emphasis cannot be placed upon the positive operation of all VOGEL Seat-Action water closets.
Vogel "Selfush" Ten and Ten-A Closets in installation in schools, institutions, comfort stations, factories, and plants, office buildings, theatres, moving picture houses, waiting rooms, of all sorts—also in residence basements.
VOGEL FROST-PROOF WATER CLOSETS
For use in enclosures, garages, mill villages, and high row perchs—any place exposed to freezing temperatures.
VOGEL NON-FROST-PROOF HYDRANTS
VOGEL FROST-PROOF WATER CLOSETS
For sheltered garages, railroad yards, and other places where freezing temperatures are encountered.
All Vogel Water Closets are seat-action—that is, body operated. There are no chains to pull, or levers to push—no balls or floats to leak, wear out, or cause trouble—and no forgetting to flush.
Vogel Closets and Hydrants are sold by wholesalers and plumbing supply dealers throughout the country.
Prepared especially for use of Architects and Engineers
This is Bulletin Number 1 of a series illustrating and describing fully VOGEL Frost-Proof and Non-Frost-Proof Closets and VOGEL Frost-Proof Hydrants
A I A 29 H 22

An Architect's Book on Vogel Seat-Action Closets for Plants, Factories, Schools and Institutions, is NOW READY

THIS book is designed especially for architects, just as Vogel Closets are designed especially for factories, schools, and institutions.

It is full of information for the architect. Each part of Vogel Seat-Action Closets — the valve, the tank, the bowl, and the seat, is taken up in detail. Complete specifications are included.

This book, conforming in size to the A. I. A. filing system, will prove invaluable to your office, and especially in the offices of school architects.

For copies of this book, write to the Joseph A. Vogel Company, Wilmington, Delaware, manufacturers of Seat-Action Closets for more than 23 years.

Joseph A. Vogel Company
Wilmington, Del. St. Louis, Mo.

COUPON
JOSEPH A. VOGEL, Wilmington, Del.
Please send me your architect's booklet on Vogel Closets.
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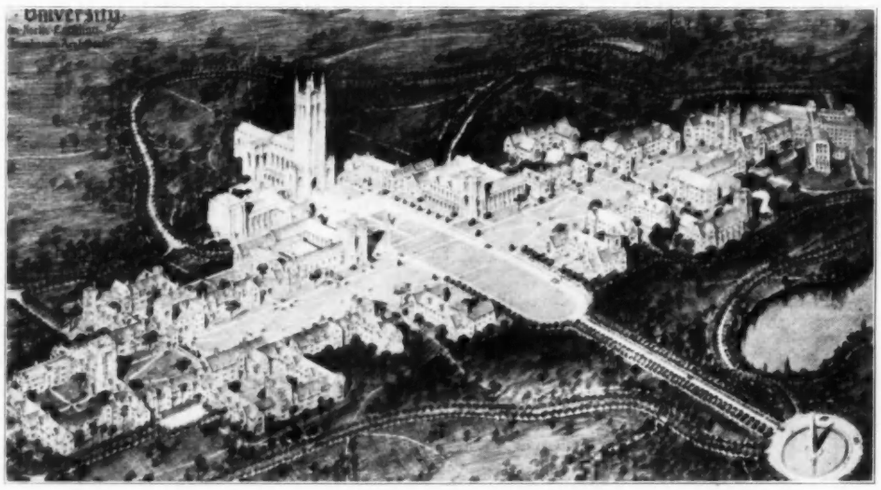
VOGEL PATENTED *Products*

ARMCO INGOT IRON



A panoramic drawing of Duke University, Durham, North Carolina, where Armco INGOT IRON *sheets were used for the ventilating ducts and fume vents and hoods in the Chemistry, Hospital and Medical Buildings. Here, where corrosion is a constant threat, pure iron will render long, trouble-free service. Architect: Horace Trumbauer, Philadelphia. Heating and Ventilating Engineer: Isaac H. Francis, Philadelphia.*

. . . it backs your specifications with *proved performance*

WHEN you specify Armco INGOT IRON, you know beforehand that the construction will endure. For this highly-refined iron has the longest record of actual service of any low-cost, rust-resisting sheets and plates.

Where workability is essential, such as in cornices, marquises, and intricate ornamental motifs, Armco INGOT IRON is again the appropriate sheet metal. It is uniformly soft and ductile, and forms quickly and surely to the most complicated design.

Armco INGOT IRON sheets and plates are available in any standard size, gage or thickness. If you have a job on the board, a member of our architects' service organization will be glad to supply any information on the sheet metal parts that you may want. Just communicate with the office nearest you.

Back of this familiar symbol is nearly thirty years' experience in the manufacture of special analysis iron and steel sheets and plates. When you want a rust-resisting, low-cost metal be sure to see this triangle and the words, "Armco INGOT IRON." *It is your assurance of dependable, economical service.*

THE AMERICAN ROLLING MILL CO.

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Export: The ARMCO International Corporation

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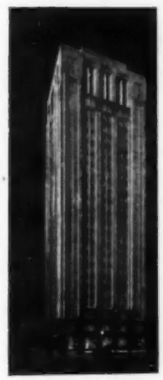
"BE SURE IT'S MADE OF ARMCO INGOT IRON"



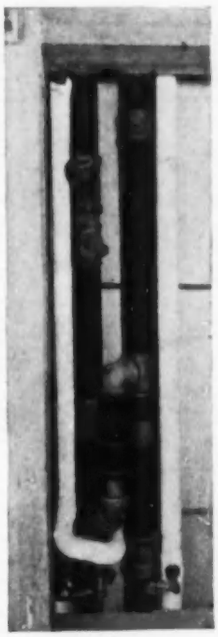
BUCKINGHAM BUILDING
Chicago

Why OWNERS, ARCHITECT and PLUMBING CONTRACTOR of this modern building chose

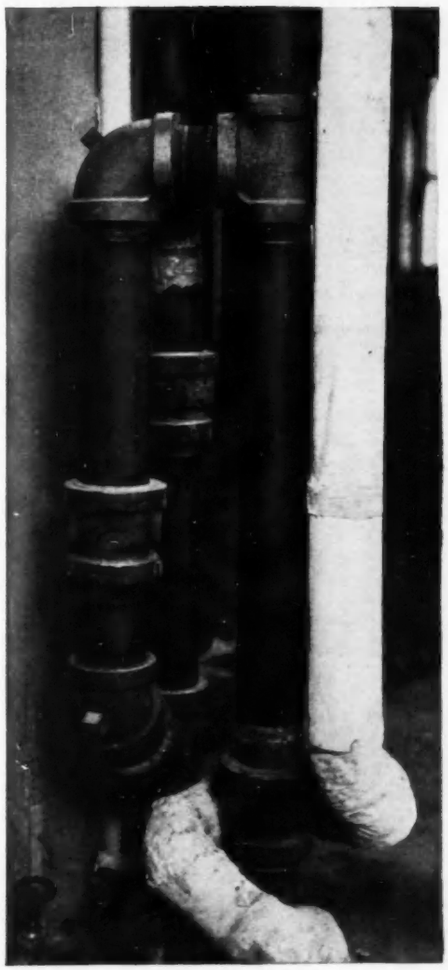
ARCO METAL

CAST IRON PIPE

VERTICALLY CAST
SEAMLESS



REGULARLY FURNISHED IN 12 FT. LENGTHS



Arco Metal Pipe is carried in stock and distributed by jobbers of plumbing, heating and mill supplies.

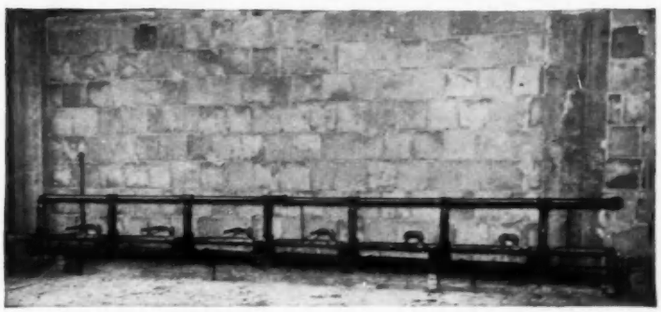
ARCO METAL PIPE IS EASY TO INSTALL. "We experienced no difficulty in handling this installation due to breakage, and the job tested perfectly tight" to use the words of the contractor, M. J. Corboy.

This is made possible by the method of manufacture and the fine grade of cast iron used in producing Arco Metal Pipe.

ARCO METAL PIPE INSURES PERMANENCE. The owners of the Buckingham Building realize the cost and inconvenience of replacing pipe. To guarantee against this they chose Arco Metal Cast Iron Pipe for all soil, waste, vent and down spout lines.

In order to cut and thread cast iron pipe it must be perfectly round, uniform in wall thickness and true in outside diameter the full length of the pipe. The cast iron must be readily machinable and strong enough to stand the usual handling.

Arco Metal Pipe fills all of these requirements. It is cast vertically in dry sand molds which gives a perfectly round seamless tube. The iron is alloyed with nickel and chromium which makes it stronger and even more corrosion-resisting than ordinary cast iron and is easily cut and threaded with standard, hand or power tools.



·ARCO·ARCO AMERICAN RADIATOR COMPANY ·ARCO·

ARCO METAL PIPE DIVISION

40 West 40th Street, New York
816 So. Michigan Avenue, Chicago
1344 Broadway, Detroit
8th and Broadway, Cincinnati
1294 East 55th Street, Cleveland
4201 Duncan Avenue, St. Louis

SOUND SYSTEMS

are of great importance to the Architect.

The best time to provide for a sound system in structures built to accommodate education, treatment of the sick, travel and entertainment, is at the time the housing for the enterprise is being planned. We will gladly send the architect full information about Powerizer for his files or have an expert call and discuss any prospect in installation, either for a new building or for one now existing.

Complete Powerizer Sound Systems are installed and serviced by our authorized electragists everywhere. Powerizer is a perfectly balanced set of units comprising all equipment for pick-up, amplification and distribution. An attractive booklet about the uses of Sound Systems will be sent upon request.

132

A great fight...

...all patients agreed

THERE is no good reason why red-blooded men should not relish listening to a prize fight, a hospital should not enjoy listening to a prize fight, a ball game or any other form of program that would cause a temperature in the case of a neurotic. With the Powerizer Sound System every set of our phones in the room can deliver a program best suited to the taste and condition of the individual patient. It is both selective and controllable . . . an ideal system for the luxurious suite. Powerizer Sound System is a set of featured units comprising all equipment to pick up through our phones and loud speakers. It is installed and serviced by our authorized electragists everywhere. Let us send you literature. Powerizer Sound Systems have been successfully used in

RADIO RECEPTOR CO., Inc.
106 West 17th St. New York City

Licensed by Radio Corporation of America and Associated Companies.

POWERIZER
SOUND SYSTEMS

The original of this reprinted advertisement appeared in the April issue of Modern Hospital.

RADIO RECEPTOR CO., INC.
106A Seventh Ave., New York City

Licensed by the Radio Corporation of America and Associated Companies (A.F. 6-30)

POWERIZER
SOUND SYSTEMS

MEYER
Steelforms
THE STANDARD

Inquiries will establish the fact that Meyer Steelforms are the standard for concrete joist floor construction.

CONCRETE ENGINEERING COMPANY
General Offices: Omaha, Nebraska
Branches in all principal cities

By Using HAMLIN DOORS

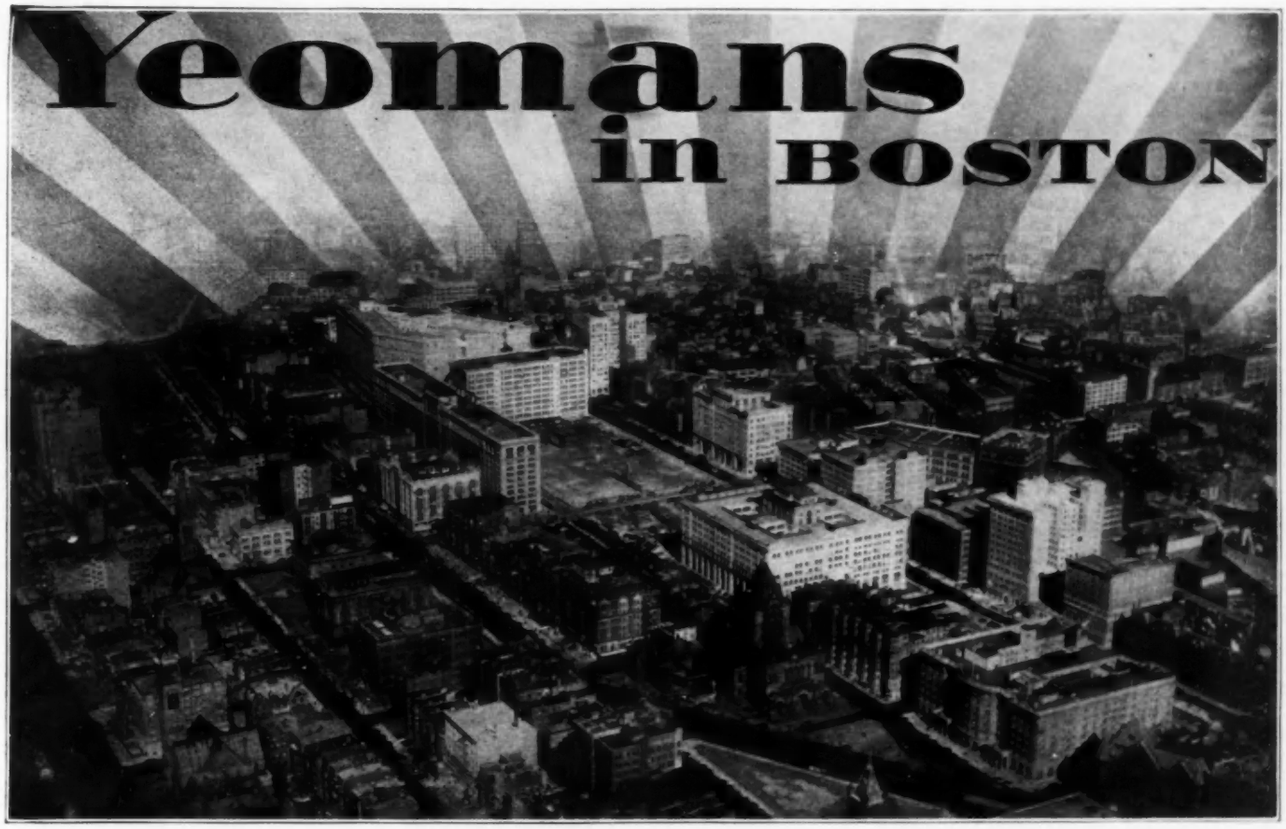
"Have sound-proof offices by using Hamlin doors" is the recommendation that scores of architects are now making to their clients.

Hundreds of modern buildings—skyscrapers, clubs, studios, schools, "talkies," theatres, libraries, homes, hotels, churches, hospitals and institutions, etc., are using Hamlin Sound-Proof Doors and Folding Partitions as a part of the necessary standard equipment of this modern age. No better argument could be had for securing rentals and leases.

Sound-proof doors today play an important part in business and social life. Privacy is becoming more and more necessary as business and industry progress. Sound-proof offices for executives insure the necessary peace for uninterrupted thought, freedom of outside interference and assurance of complete privacy and quiet.

Write for list of recent installations, complete catalog, prices and services available to architects.

IRVING HAMLIN
MANUFACTURER
1514 Lincoln St.
Evanston, Ill.



Sanitation demands it

Partial list of Yeomans installations in Boston, Mass.

OFFICE BUILDINGS

Boston Consolidated Gas Co.
Park Square Building
Salada Tea Company
Paine Furniture Co.
United Shoe Machinery Corp.
Rice Building
Insurance Exchange Building
Public Service Building
N. E. Tel. & Tel. Co.
Brewer Building
Wm. Filene's Sons Co.
Waterman Building
Chamber of Commerce
Employers Liability Ins. Corp.
Little Building
Province Building
Woolworth Building
Stone and Webster Building
Motor Mart

HOTELS

Touraine
Parker House
Kenmore
Statler
North Station
Copley Plaza

BANKS

Federal Reserve
First National
National Shawmut
Merchants National
Atlantic National
Union Institution for Savings
Harris-Forbes Co.
Boston Safe Deposit & Trust Co.
Boston Five Cents Savings
Manufacturers National

MISCELLANEOUS

Harvard University
City of Boston
First National Stores
Sears Roebuck & Co.
State Mounted Armory
Beth Israel Hospital
Newton Hospital
Massachusetts General Hospital
Keith Memorial Theatre
Boston Edison Co.
South Station
North Station

Representatives in principal cities

THE leading buildings in Boston, as elsewhere, are Yeomans equipped. No greater assurance of sanitation is possible than the knowledge that the sewage and drainage facilities of your buildings are designed for protection against floods, cloudbursts and other emergencies. Yeomans pumps noiselessly, efficiently and automatically handle all sewage ejection requirements. Their performance underground goes on uninterruptedly 24 hours a day under all conditions.

Architects and engineers are urged to send their specifications and problems to our skilled engineers for review. This consultation is a part of our service to you. A letter will bring catalogs describing our products.

YEOMANS BROTHERS COMPANY

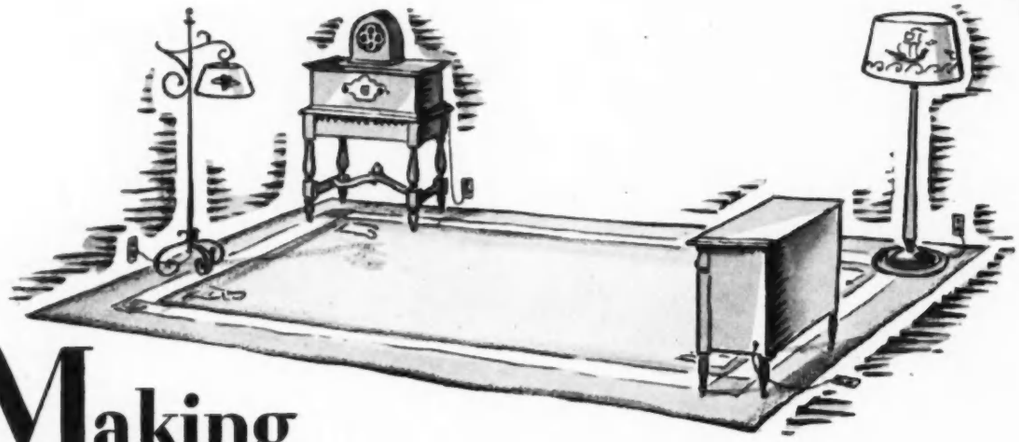
1424 Dayton Street,

Chicago

Yeomans Pumps

Sewage and Drainage

YEOMANS PUMPS · GIVE YEOMAN SERVICE ·



Making the living room *livable* with Non-Metallic Sheathed Cable

In the living room of the houses you are building...how many electrical devices will the new and proud owners have? You don't know and neither do we! But, nowadays it's safe to say... aside from permanent lighting fixtures ...there will be a radio, **a phonograph,** **and probably two floor**

NON-METALLIC

lamps, and that means, at least *four* outlets.

By using Non-Metallic Sheathed Cable, your house can be completely wired with the necessary number of circuits and outlets... at lower cost.

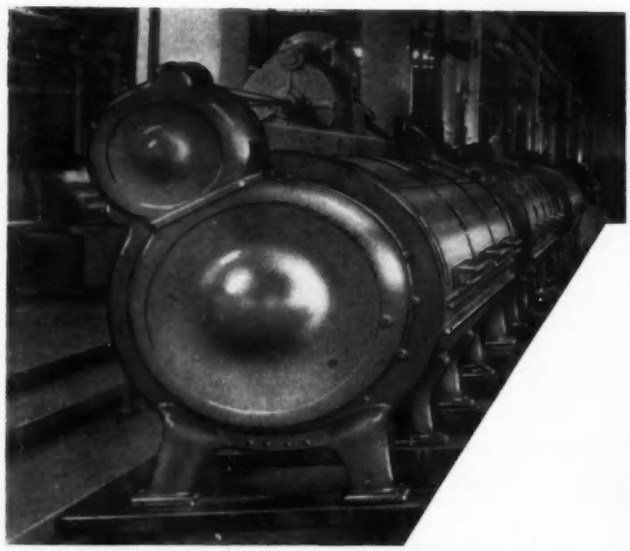
A Non-Metallic Sheathed Cable job will last as long as the house itself.

For complete information ask your electrical contractor— or write to any of the Licensed Manufacturers listed below for the booklet—"Where and How to Use Non-Metallic Sheathed Cable"

American Circular Loom Company
Anaconda Wire and Cable Company
Collyer Insulated Wire Company
Eastern Tube and Tool Company
General Electric Company
Marion Insulated Wire and Rubber Company
National Metal Molding Division
National Electric Products Corporation
Rome Wire Company
Division of General Cable Corporation
The Wiremold Company
Triangle Conduit Company, Inc.

The above Manufacturers are Licensed under Non-metallic Sheathed Cable Patents number 1439323; 1520680; 1203788; 1673752.

SHEATHED CABLE



BIG UNITS THAT SAVE SPACE

ARCHITECTS find that General Laundry Machinery fully meets their requirements for conserving space in the design of laundry plants.

Its high production rate is an important factor in planning commercial and institutional laundries, where output must be closely figured on a per-square-foot basis. The General 54″ x 120″ Y-Type All-Metal Washer, for example, sets a record for delivering 12.2 lbs. of work per square foot of floor area for an average run. This efficiency is typified right through the entire General line of equipment.

Superlative construction and mechanical refinements are evidenced by All-Metal Washers with Timken bearings and Alemite lubrication; Tolhurst Extractors with the Center-Slung feature that reduces vibration; Updraft Dry Tumblers with the natural drying action; and General Calenders with air-compression ironing rolls.

Specification bulletins will be sent promptly on request.

GENERAL LAUNDRY MACHINERY CORP.
822 West Washington Boulevard, Chicago, U. S. A.
Factories: Chicago, Ill.; Troy, N.Y.; Green Island, N.Y.; Columbia, Pa.

SALES OFFICES:

Chicago, Ill. 822 W. Washington Blvd.
New York, N. Y. 183 Madison Ave.
San Francisco, Cal. 1128 Mission St.
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Seattle, Wash. 105 Western Ave., West
Houston, Texas Houston Merchants Exch. Bldg.
Pittsburgh, Pa., 631 Grant Bldg.

GENERAL
Laundry Machinery

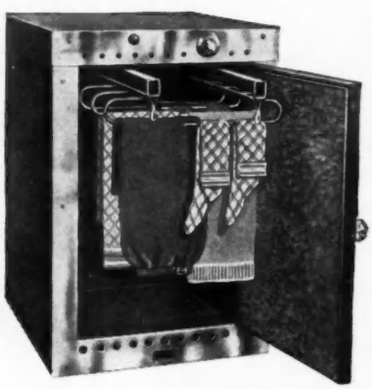
Built to a standard GENERAL LAUNDRY MACHINERY Corporation *— not to a price*

PROMETHEUS

Electric Clothes Dryer

The Prometheus dries clothes quickly at a low cost for current.

Indispensable in golf and country clubs for drying sports wearing apparel, or in the home for drying silk underthings too delicate to send to the laundry.



Heat is easily controlled by a 3-heat switch. A ruby pilot light shows whether the current is on or off.

Chromium plated and beautifully finished.

Has easy-sliding racks with hangers. Two sizes —20 or 36 inches wide —both 30″ high and 22″ deep.

SEND FOR CATALOG

PROMETHEUS ELECTRIC CORP.
358 West 13th St. New York, N. Y.

DETAILS

KERNERATORS are not just a combination of masonry and cast iron, but scientifically designed systems built — by the pioneers of flue-fed incineration — to do a specific job.

Seventeen years of intensive study of incineration, of consistent improvement of the details of construction, have earned for Kernerators a place of leadership.

And a trained, nation-wide service organization that assists in planning Kernerator installations, that supervises their construction and personally instructs owners, insures maximum convenience in Kernerator use.

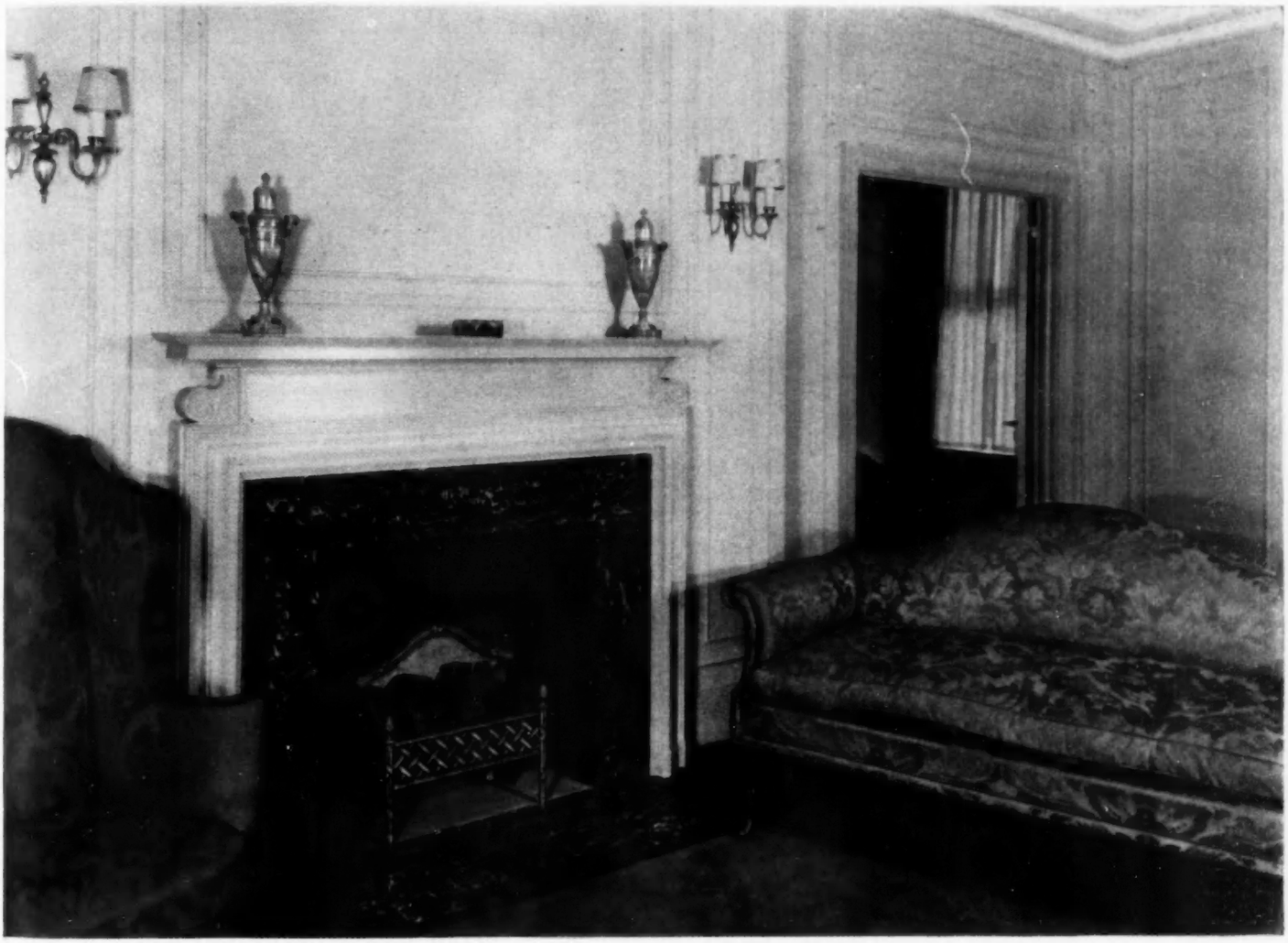
This attention to details — before, during and after installation — is a typical Kerner service that is valuable to both architect and owner . . . It assures a lifetime effectiveness of the Kerner Guarantee.

KERNER INCINERATOR COMPANY
1224 NORTH WATER ST. MILWAUKEE, WIS.

KERNERATOR
REG. U.S. PAT. OFF.
INCINERATION

YOU can easily imagine the inconvenience and expense of pipe in a home that leaks! Concealed in walls, buried under floors, this pipe is hidden danger if it is of inferior quality. Property loss and family discomfort are often the toll of its presence. That is why architects specify Byers Genuine Wrought-Iron Pipe and plumbing and heating contractors welcome it. . . . It is the ultimate in protection. It is a standard specification in the construction of better homes everywhere, an investment in security and service when it replaces pipe that has failed to measure up to the trying tests imposed upon it. . . . General experience has established the fact that, in most cases, Byers Genuine

LASTING PROTECTION OF BEAUTY AND CHARM



Wrought-Iron Pipe outlasts the structures in which it is installed. Today wrought-iron over 100 years old is still rendering satisfactory service. It is the only metal that contains the *Vital Element*—silicate of iron—in quantity to successfully resist the corroding influences of time. . . . In the rolling of wrought-iron, made from the scientific puddling of pig iron, the *Vital Element* divides into tiny ribbons, 250,000 and more to the square inch of metal, as impervious to rust as the silicate in glass. . . . The name "Byers" imprinted in the metal is assurance of quality. The Spiral Stripe is further guarantee. If you would like specific suggestions on any pipe problem, we will take pleasure in aiding you. The benefit of constant research on this important subject is available to you. We will be pleased to send you our booklet which tells more about Byers Genuine Wrought-Iron Pipe and its uses. A. M. Byers Company, Pittsburgh, Pa.

BYERS GENUINE WROUGHT IRON PIPE

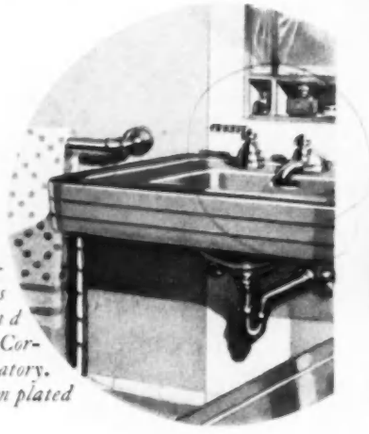
AN INVESTMENT—NOT AN OUTLAY

New BATHROOM FITTINGS

by artists of America and France

Spout from the Espagnol-Flamand group. Gold plated

Spout from the English Georgian group. Gold plated



Moderne-Clochettes legs and trim on a Corwith lavatory. Chromium plated

Exquisitely flower-like Design 45 handles, escutcheons, and spouts here adorn a Neumar lavatory, a bath, and shower. Even the legs of the Neumar are of related design

Trianon legs and trim on a marble lavatory. Gold plating effectively brings out the delicate ornamentation

Interesting examples of the work of American artists are the Designs 50, 45, and 40. Note the pleasing effects of contrasting metal and crystal in Design 50; the exquisite filigree work of Design 45; the modern touch in the octagonal planes of Design 40. Platings may be gold, silver, or chromium, on a base of serviceable brass, applied by a special process to prevent peeling and assure complete coverage.

Beneath the surface loveliness of all the fittings shown above, French as well as American, is such engineering quality as only the Crane stamp assures.

BEAUTIFUL design brought new charm to bathroom fixtures. Why need the fittings remain commonplace? These Crane trimmings for lavatories, baths, and showers answer: "They need not."

New, distinctive, they run the decorative gamut from antique to modern, period to present day. Trianon fittings, inspired by the exquisite ornamental bronze in the palaces of Trianon and Versailles... Espagnol-Flamand, with the charm of fine metal work in a mansion of Madrid . . . Georgian . . . Moderne-Clochettes; twenty designs are offered, originated for Crane Co. in the Fontaine ateliers of France. No less beautiful and wholly American are the octagonal Design 40, the fluted Design 45, and the glass-handled Design 50, from our own studios.

See these at nearby Crane Exhibit Rooms. You will recognize their value for homes above the average. The Crane Budget Plan permits Crane Qualified Contractor-Dealers to install them on monthly payments, if desired.

Valves **CRANE** *Fittings*

FIXTURES, VALVES, FITTINGS, AND PIPING, FOR DOMESTIC AND INDUSTRIAL USE

Crane Co., General Offices: 836 S. Michigan Ave., Chicago • 23 W. 44th St., New York • Branches and sales offices in one hundred and ninety-four cities

Selected List of Manufacturers' Publications

FOR THE SERVICE OF ARCHITECTS, ENGINEERS, DECORATORS, AND CONTRACTORS

The publications listed in these columns are the most important of those issued by leading manufacturers identified with the building industry. They may be had without charge unless otherwise noted, by applying on your business stationery to *The Architectural Forum*, 521 Fifth Ave., New York, or the manufacturer direct, in which case kindly mention this publication.

ACOUSTICS

R. Guastavino Co., 40 Court Street, Boston.
Akoustolith Plaster. Brochure, 6 pp., 8½ x 11 ins. Akoustolith as Related to Architectural Acoustics. Booklet 10 pp., 8½ x 11 ins.

Johns-Manville Corporation, New York.
Sound-Absorbing Treatment in Banks and Offices. Booklet, 18 pp., 8½ x 11 ins. Illustrated.
Sound-Absorbing Treatment in Churches and Religious Institutions. Brochure. 22 pp., 8½ x 11 ins. Illustrated.

ASH HOISTS

Gillis & Geoghegan, Inc., 544 West Broadway, New York.
G & G Telescopic Hoist catalog, 8½ x 11 A. I. A. Standard Classification 30il, contains complete descriptions, method of selecting correct model to fit the building's needs, scaled drawings showing space requirements and specifications.

ASH HOISTS—TELESCOPIC

Gillis & Geoghegan, Inc., 544 West Broadway, New York.
G & G Telescopic Hoist catalog, 8½ x 11 A. I. A. Standard Classification 30il, contains complete descriptions, method of selecting correct model to fit the building's needs, scaled drawings showing space requirements and specifications.

BRICK

Hanley Company, Bradford, Pa.
General Catalog. 16 pp. 8½ x 11 ins. Illustrated.
Bradford Reds. Folder. 8 pp., 3 x 8 ins. Illustrated.

CABINET WORK

Henry Klein & Co., 25 Grand Street, Elmhurst, L. I., N. Y.
Driwood Period Mouldings in Ornamented Wood. Brochure, 28 pp., 8½ x 11 ins. Illustrated.
Ensemble Offices for the Banker and Broker. Folder. 4 pp., 8½ x 11 ins. Illustrated.
Luxurious Office Partitions in Walnut, Mahogany and Quartered Oak. Folder. 4 pp., 8½ x 11 ins. Illustrated.

CARPETS

Collins & Aikman Corporation, 25 Madison Avenue, New York.
"Seemingly Seamless Carpets." Booklet, 8 pp., 8½ x 11 ins. Illustrated.

CEMENT

Carney Company, The, Mankato, Minn.
A Remarkable Combination of Quality and Economy. Booklet, 20 pp., 8½ x 11 ins. Illustrated. Important data on valuable material.

Louisville Cement Co., 315 Guthrie St., Louisville, Ky.
BRIXMENT for Perfect Mortar. Self-filing handbook, 8¼ x 11 ins. 16 pp. Illustrated. Contains complete technical description of BRIXMENT for brick, tile and stone masonry, specifications, data and tests.

Portland Cement Association, Chicago, Ill.
Concrete Masonry Construction. Booklet, 48 pp., 8½ x 11 ins. Illustrated. Deals with various forms of construction.
Town and Country Houses of Concrete Masonry. Booklet, 20 pp., 8½ x 11 ins. Illustrated.
Facts About Concrete Building Tile. Brochure, 16 pp., 8½ x 11 ins. Illustrated.
The Key to Firesafe Homes. Booklet, 20 pp., 8½ x 11 ins. Illustrated.
Design and Control of Concrete Mixers. Brochure, 32 pp., 8½ x 11 ins. Illustrated.
Portland Cement Stucco. Booklet, 64 pp., 8½ x 11 ins. Illustrated.
Concrete in Architecture. Bound Volume, 60 pp., 8½ x 11 ins. Illustrated. An excellent work, giving views of exteriors and interiors.

CHURCH EQUIPMENT

John Van Range Co., Cincinnati.
Practical Planning for Church Food Service. Booklet, 32 pp., 8½ x 11 ins. Illustrated.

CLUB EQUIPMENT

John Van Range Co., Cincinnati.
Practical Planning for Club Food Service. Booklet, 32 pp., 8½ x 11 ins. Illustrated.

CONCRETE BUILDING MATERIALS

Concrete Steel Company, 42 Broadway, New York.
Modern Concrete Reinforcement. Booklet, 32 pp., 8½ x 11 ins. Illustrated.

CONSTRUCTION, FIREPROOF

National Fire Proofing Co., 250 Federal St., Pittsburgh, Pa.
Standard Fire Proofing Bulletin 171. 8½ x 11 ins., 32 pp. Illustrated. A treatise on fireproof floor construction.

CONSTRUCTION, STONE AND TERRA COTTA

Cowing Pressure Relieving Joint Company, 100 North Wells St., Chicago, Ill.
Pressure Relieving Joint for Buildings of Stone, Terra Cotta or Marble. Booklet, 16 pp., 8½ x 11 ins. Illustrated. Deals with preventing cracks, spalls and breaks.

DAMPPROOFING

Minwax Company, Inc., 11 West 42nd St., New York.
Complete Index of all Minwax Products. Folder, 6 pp., 8½ x 11 ins. Illustrated. Complete description and detailed specifications.

Toch Brothers, New York, Chicago, Los Angeles.
Handbook of R. I. W. Protective Products. Booklet, 40 pp., 4½ x 7½ ins.

DOORS

David Lupton's Sons Company, Philadelphia.
Lupton Commercial Steel Doors. Folder. 8½ x 11 ins. Illustrated.
Lupton Steel Industrial Doors. Brochure. 8 pp., 8½ x 11 ins. Illustrated. Details and specifications.

DOORS AND TRIM, METAL

The American Brass Company, Waterbury, Conn.
Anaconda Architectural Bronze Extruded Shapes. Brochure, 180 pp., 8½ x 11 ins., illustrating and describing more than 2,000 standard bronze shapes of cornices, jamb casings, mouldings, etc.

William Bayley Co., 147 North Street, Springfield, Ohio.
Bayley Tubular Steel Doors. Brochure, 16 pp., 8½ x 11 ins. Illustrated.

The Kawneer Company, Niles, Michigan.
Detail sheet, 8½ x 11 ins., with A.I.A. File No. featuring Heavy Welded Bronze Doors.

Richards-Wilcox Mfg. Co., Aurora, Ill.
Fire-Doors and Hardware. Booklet, 8½ x 11 ins., 64 pp. Illustrated. Describes entire line of tin-clad and corrugated fire doors, complete with automatic closers, track hangers and all the latest equipment—all approved and labeled by Underwriters' Laboratories.

Truscon Steel Company, Youngstown, Ohio.
Copper Alloy Steel Doors. Catalog 110. Booklet, 48 pp., 8½ x 11 ins. Illustrated.

DOORS, SOUNDPROOF

Irving Hamlin, Evanston, Ill.
The Evanston Soundproof Door. Folder, 8 pp., 8½ x 11 ins. Illustrated. Deals with a valuable type of door.

DRAINAGE FITTINGS

Josam Mfg. Co., Michigan City, Ind.
Josam Products. Booklet, 73 pp., 8½ x 11 ins. Illustrated. A valuable line of accessories.
Josam-Marsh Grease, Plaster, Sediment and Hair Interceptors. Brochure. 7 pp., 8½ x 11 ins. Illustrated.
Josam New Saw Tooth-Roof Drain. Folder, 4 pp., 8½ x 11 ins. Illustrated.

REQUEST FOR CATALOGS

To get any of the catalogs described in this section, put down the title of the catalog desired, the name of the manufacturer and send coupon to THE ARCHITECTURAL FORUM, 521 Fifth Avenue, New York.

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Name ..... **Business** .....

Address .....

SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—*Continued from page 185*

DRINKING FOUNTAINS

Halsey W. Taylor Co., Warren, Ohio
Halsey Taylor Drinking Fountains. Architects' Catalog H. 52 pp., 8½ x 11 ins. Illustrated.

DUMBWAITERS

Sedgwick Machine Works, 151 West 15th St., New York, N. Y.
Catalog and Service Sheets. Standard specifications, plans and prices for various types, etc. 4¼ x 8¼ ins., 60 pp. Illustrated.
Catalog and pamphlets, 8½ x 11 ins. Illustrated. Valuable data on dumbwaiters.

ELECTRICAL EQUIPMENT

The Electric Storage Battery Co., Philadelphia.
Emergency Lighting and Emergency Power Data. Booklet. 12 pp., 8½ x 11 ins. Illustrated.

General Electric Co., Merchandise Dept., Bridgeport, Conn.
Wiring System Specification Data for Apartment Houses and Apartment Hotels. Booklet, 20 pp., 8 x 10 ins. Illustrated.
Electrical Specification Data for Architects. Brochure, 36 pp., 8 x 10½ ins. Illustrated. Data regarding G. E. wiring materials and their use.
The House of a Hundred Comforts. Booklet, 40 pp., 8 x 10½ ins. Illustrated. Dwells on importance of adequate wiring.

Prometheus Electric Corporation, 360 West 13th St., New York.
Electric Heating Specialties. Booklet, 24 pages. 8½ x 11 ins. Illustrated. Specialties for heating, cooking, hospitals, organ lofts, etc.

Ward Leonard Electric Co., Mt. Vernon, N. Y.
Mobile Color Lighting. Booklet, 46 pp., 8½ x 11 ins. Illustrated. Valuable work on the subject.

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
Electric Power for Buildings. Brochure, 14 pp., 8½ x 11 ins. Illustrated. A publication important to architects and engineers.
Variable-Voltage Central Systems as Applied to Electric Elevators. Booklet, 12 pp., 8½ x 11 ins. Illustrated. Deals with an important detail of elevator mechanism.
Modern Electrical Equipment for Buildings. Booklet, 8½ x 11 ins. Illustrated. Lists many useful appliances.
Electrical Equipment for Heating and Ventilating Systems. Booklet, 24 pp., 8½ x 11 ins. Illustrated. This is "Motor Application Circular 7379."
Westinghouse Panelboards. Catalog 224. Booklet, 64 pp., 8½ x 11 ins. Illustrated.
Beauty; Power; Silence; Westinghouse Fans. (Dealer Catalog 45.) Brochure, 16 pp., 8½ x 11 ins. Illustrated. Valuable information on fans and their uses.
Electric Range Book for Architects (A. I. A. Standard Classification 31 G-4). Booklet, 24 pp., 8½ x 11 ins. Illustrated. Cooking apparatus for buildings of various types.
Westinghouse Commercial Cooking Equipment (Catalog 280). Booklet, 32 pp., 8½ x 11 ins. Illustrated. Equipment for cooking on a large scale.
Electric Appliances (Catalog 44-A). 32 pp., 8½ x 11 ins. Deals with accessories for home use.

ELEVATORS

Otis Elevator Company, 260 Eleventh Ave., New York, N. Y.
Otis Push Button Controlled Elevators. Descriptive leaflets, 8½ x 11 ins. Illustrated. Full details of machines, motors and controllers for these types.
Otis Geared and Gearless Traction. Elevators of All Types. Descriptive leaflets, 8½ x 11 ins. Illustrated. Full details of machines, motors and controllers for these types.
Escalators. Booklet, 8½ x 11 ins., 22 pp. Illustrated. Describes use of escalators in subways, department stores, theaters and industrial buildings. Also includes elevators and dock elevators.

Richards-Wilcox Mfg. Co., Aurora, Ill.
Elevators. Booklet, 8½ x 11 ins., 24 pp. Illustrated. Describes complete line of "Ideal" elevator door hardware and checking devices, also automatic safety devices.

Sedgwick Machine Works, 151 West 15th St., New York, N. Y.
Catalog and descriptive pamphlets, 4¼ x 8¼ ins., 70 pp. Illustrated. Descriptive pamphlets on hand power freight elevators, sidewalk elevators, automobile elevators, etc.
Catalog and pamphlets, 8½ x 11 ins. Illustrated. Important data on different types of elevators.

ESCALATORS

Otis Elevator Company, 260 Eleventh Ave., New York, N. Y.
Escalators. Booklet, 32 pp., 8½ x 11 ins. Illustrated. A valuable work on an important item of equipment.

FIREPROOFING

Concrete Engineering Co., Omaha, Neb.
Handbook of Fireproof Construction. Booklet, 54 pp., 8½ x 11 ins. Valuable work on methods of fireproofing.

Concrete Steel Company, 42 Broadway, New York.
Economical Fireproof Floors for Suburban Buildings. Folder. 4 pp., 8½ x 11 ins. Illustrated.

National Fire Proofing Company, Fulton Building, Pittsburgh.
Natco; The Complete Line of Structural Clay Tile. Booklet. 48 pp., 8½ x 11 ins. Illustrated.

FLOODLIGHTING

National Terra Cotta Society, 230 Park Avenue, New York, N. Y.
Terra Cotta Buildings Are Superior for Floodlighting. Brochure, 16 pp., 8½ x 11 ins. Illustrated.

FLOOR HARDENERS (CHEMICAL)

Minwax Company, 11 West 42nd Street, New York, N. Y.
Concrete Floor Treatments. Folder, 4 pp., 8½ x 11 ins. Illustrated.

Toch Brothers, New York, Chicago, Los Angeles.
Handbook of R.I.W. Protective Products. Booklet, 40 pp., 4½ x 7½ ins.

FLOORS—STRUCTURAL

Concrete Steel Company, 42 Broadway, New York.
Structural Economies for Concrete Floors and Roofs. Brochure, 32 pp., 8½ x 11 ins. Illustrated.

Truscon Steel Co., Youngstown, Ohio.
Truscon Floretyle Construction. Booklet, 8½ x 11 ins., 16 pp. Illustrations of actual jobs under construction. Lists of properties and information on proper construction. Proper method of handling and tables of safe loads.

Structural Gypsum Corporation, Linden, N. J.
Gypsteel Pre-cast Fireproof Floors. Booklet, 36 pp., 8½ x 11 ins. Illustrated. Data on flooring.
Service Sheet No. 3. Specifications and Details of Design and Construction for Gypsteel Pre-Cast Floors and Ceilings. Folder, 8½ x 11 ins. Illustrated.

FLOORING

Armstrong Cork Co. (Linoleum Division), Lancaster, Pa.
Armstrong's Linoleum Floors. Catalog, 8½ x 11 ins., 44 pp. Color plates. A technical treatise on linoleum, including table of gauges and weights and specifications for installing linoleum floors. Newly revised, February, 1929.
Armstrong's Linoleum Pattern Book, 1929. Catalog, 9 x 12 ins., 44 pp. Color plates. Reproduction in color of all patterns of linoleum and cork carpet in the Armstrong line.
Linoleum Layer's Handbook. 5 x 7 ins., 36 pp. Instructions for linoleum layers and others interested in learning most satisfactory methods of laying and taking care of linoleum.
Enduring Floors of Good Taste. Booklet, 6 x 9 ins., 48 pp. Illustrated in color. Explains use of linoleum for offices, stores, etc., with reproductions in color of suitable patterns, also specifications and instructions for laying.

Blabon-Sandura Company, Inc., Finance Building, Philadelphia.
Blabon's Linoleum Styles for 1930. Booklet, 64 pp., 6¼ x 8½ ins. Illustrated.
Detailed Instructions for Handling and Laying Linoleum. Brochure, 40 pp., 3¼ x 5¾ ins. Illustrated.
Blabon's Linoleum Floors and Where You Will Find Them. Booklet, 8 pp., 8½ x 11 ins. Illustrated.
Comparison of Tests. Folder, 8½ x 11 ins. Illustrated.

Cellized Oak Flooring, Memphis, Tenn.
Style in Oak Floors. Booklet, 16 pp., 6 x 9 ins. Illustrated.

Congoleum-Nairn, Inc., 195 Belgrove Drive, Kearny, N. J.
Facts you should know about Resilient Floors. A series of booklets on floors for (1) schools, (2) hospitals, (3) offices, (4) stores, (5) libraries, (6) churches, (7) clubs and lodges, (8) apartments and hotels. Illustrated.
Specifications for Resilient Floors. Booklet, 12 pp. A reprint from Sweet's.
A New Kind of Floor Service. Brochure, 8 pp. Data on Bonded Floors.
Sealex Battleship Linoleum. Booklet, 12 pp. Illustrated. Shows typical installations.
Sealex Treadlite Tiles. Two booklets, 8 and 16 pp. Illustrated.
Colonial Planks. Brochure, 8 pp. Illustrated.

Goodyear Tire & Rubber Co., Inc., Akron, Ohio.
Beautiful Floors, Architects' Reference Book. Brochure, 32 pp., 8½ x 11 ins. Illustrated. Valuable data on flooring.
Rubber Flooring News Monthly publications. 8½ x 11 ins. Illustrated. Giving data on flooring for buildings of many types.
Manual of Goodyear Rubber Tile Installation Booklet. 7¾ x 10¾ ins. Illustrated.

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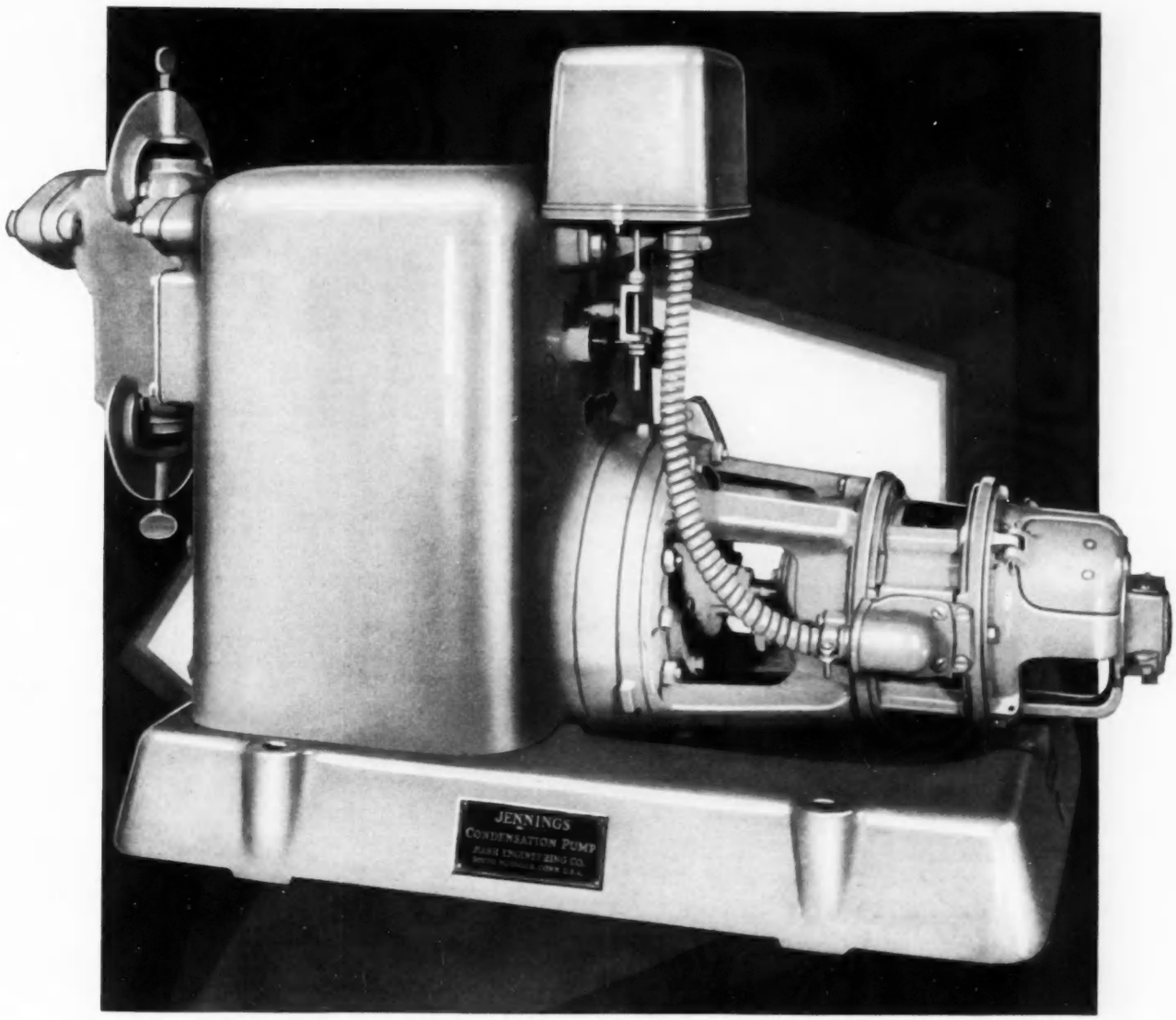

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Jennings Pumps

THE NASH ENGINEERING CO., 12 WILSON ROAD, SOUTH NORWALK, CONN.

SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—*Continued from page 186*

FLOORING—Continued

C. Pardee Works, 101 Park Ave., New York, N. Y., and 1600 Walnut St., Philadelphia, Pa.
Pardee Tiles. Bound Volume, 48 pp., 8½ x 11 ins. Illustrated.

Stedman Rubber Flooring Company, South Braintree, Mass.
Stedman Ray-Proof Rubber. Booklet, 12 pp., 5½ x 8 ins. Illustrated. For X-ray Rooms.
Stedman Tile, The Original Reinforced Rubber Floor. Booklet, 16 pp., 8½ x 11 ins. Illustrated. Valuable data on flooring.

Structural Gypsum Corporation, Linden, N. J.
Gypsteel Pre-cast Fireproof Floors. Booklet, 36 pp., 8½ x 11 ins. Illustrated. Data on floorings.

U. S. Gypsum Co., Chicago.
Pyrobar Floor Tile. Folder, 8½ x 11 ins. Illustrated. Data on building floors of hollow tile and tables on floor loading.

FURNITURE

American Seating Co., 14 E. Jackson Blvd., Chicago, Ill.
Art Ecclesiastical Booklet, 6 x 9 ins., 48 pp. Illustrations of church fitments in carved wood.
Theatre Chairs. Booklet, 6 x 9 ins., 48 pp. Illustrations of theatre chairs.

Kittinger Co., 1893 Elmwood Ave., Buffalo, N. Y.
Kittinger Club & Hotel Furniture. Booklet, 20 pp., 6¼ x 9½ ins. Illustrated. Deals with fine line of furniture for hotels, clubs, institutions, schools, etc.
Kittinger Club and Hotel Furniture. Booklet, 20 pp., 6 x 9 ins. Illustrated. Data on furniture for hotels and clubs.
A Catalog of Kittinger Furniture. Booklet, 78 pp., 11 x 14 ins. Illustrated. General Catalog.

GLASS CONSTRUCTION

Adamson Flat Glass Co., Clarksburg, W. Va.
Quality and Dependability. Folder, 2 pp., 8½ x 11 ins. Illustrated. Data in the company's product.

Libbey-Owens Sheet Glass Co., Toledo, Ohio.
Flat Glass. Brochure, 12 pp., 5⅛ x 7⅝ ins. Illustrated. History of manufacture of flat, clear, sheet glass.

GREENHOUSES

King Construction Company, North Tonawanda, N. Y.
King Greenhouses for Home or Estate. Portfolio of half-tone prints, varnishes, 8¼ x 10½ ins.

William H. Lutton Company, 267 Kearney Ave., Jersey City, N. J.
Greenhouses of Quality. Booklet, 50 pp., 8½ x 11 ins. Illustrated. Conservatories making use of Lutton Patented Galvanized Steel V-Bar.

GYPSUM

Structural Gypsum Corporation, Linden, N. J.
Service Sheet No. 1. Specifications and Details of Design and Construction for Gypsteel Pre-Cast Long-Span Roofs. Folder, 8½ x 11 ins. Illustrated. Service Sheet No. 2. Specifications and Details of Design and Construction for Gypsteel Pre-Case Short-Span Roofs. Folder, 8½ x 11 ins. Illustrated.

HARDWARE

P. & F. Corbin, New Britain, Conn.
Early English and Colonial Hardware. Brochure, 8½ x 11 ins. An important illustrated work on this type of hardware.
Locks and Builders' Hardware. Bound Volume, 486 pp., 8½ x 11 ins. An exhaustive, splendidly prepared volume.
Colonial and Early English Hardware. Booklet, 48 pp.. 8½ x 11 ins. Illustrated. Data on hardware for houses in these styles.

Cutler Mail Chute Company, Rochester, N. Y.
Cutler Mail Chute Model F. Booklet, 4 x 9¼ ins., 8 pp. Illustrated.

Richards-Wilcox Mfg. Co., Aurora, Ill.
Distinctive Garage Door Hardware. Booklet, 8½ x 11 ins., 66 pp. Illustrated. Complete information accompanied by data and illustrations on different kinds of garage door hardware.
Distinctive Elevator Door Hardware. Booklet, 90 pp., 10½ x 16 ins. Illustrated.

Russell & Erwin Mfg. Co., New Britain, Conn.
Hardware for the Home. Booklet, 24 pp., 3½ x 6 ins. Deals with residence hardware.
Door Closer Booklet. Brochure, 16 pp., 3½ x 6 ins. Data on a valuable detail.
Garage Hardware. Booklet, 12 pp., 3½ x 6 ins. Hardware intended for garage use.
Famous Homes of New England. Series of folders on old homes and hardware in style of each.

HARDWARE—Continued

Todhunter, Inc., 119 East 57th St., New York, N. Y.
Colonial Hardware. Booklet. 12 pp., 8½ x 11 ins. Illustrated. Deals with hardware of the best type for exterior and interior use.

HEATING EQUIPMENT

American Blower Co., 6004 Russell St., Detroit, Mich.
Heating and Ventilating Utilities. A binder containing a large number of valuable publications, each 8½ x 11 ins., on these important subjects.

American Radiator Company, The, 40 West 40th St., N. Y. C.
Ideal Boilers for Oil Burning. Catalog 5½ x 8½ ins., 36 pp. Illustrated in 4 colors. Describing a line of Heating Boilers especially adapted to use with Oil Burners.
Corto—The Radiator Classic. Brochure, 5½ x 8½ ins., 16 pp. Illustrated. A brochure on a space-saving radiator of beauty and high efficiency.
Ideal Arcola Radiator Warmth. Brochure, 6¼ x 9½ ins. Illustrated. Describes a central all-on-one-floor heating plant with radiators for small residences, stores, and offices.
How Shall I Heat My Home? Brochure, 16 pp., 5¾ x 8½ ins. Illustrated. Full data on heating and hot water supply.
New American Radiator Products. Booklet, 44 pp., 5 x 7¼ ins. Illustrated. Complete line of heating products.
A New Heating Problem. Brilliantly Solved. Broadside, 4 pp., 10¾ x 15 ins. Illustrated. Data on the IN-AIRID invisible air valve.
In-Airid, the Invisible Air Valve. Folder, 8 pp., 3½ x 6 ins. Illustrated. Data on a valuable detail of heating.
The 999 ARCO Packless Radiator Valve. Folder, 8 pp., 3½ x 6 ins. Illustrated.

James B. Clow & Sons, 534 S. Franklin St., Chicago, Ill.
Clow Gasteam Vented Heating System. Brochure, 24 pp., 8½ x 11 ins. Illustrated. Deals with a valuable form of heating equipment for using gas.

C. A. Dunham Company, 450 East Ohio St., Chicago, Ill.
Dunham Radiator Trap. Bulletin 101, 8 x 11 ins., 12 pp. Illustrated. Explains working of this detail of heating apparatus.
Dunham Packless Radiator Valves. Bulletin 104, 8 x 11 ins., 8 pp. Illustrated. A valuable brochure on valves.
Dunham Return Heating System. Bulletin 109, 8 x 11 ins. Illustrated. Covers the use of heating apparatus of this kind.
Dunham Vacuum Heating System. Bulletin 110, 8 x 11 ins., 12 pp. Illustrated.
The Dunham Differential Vacuum Heating System. Bulletin 114. Brochure, 12 pp., 8 x 11 ins. Illustrated. Deals with heating for small buildings.
The Dunham Differential Vacuum Heating System. Bulletin 115. Brochure, 12 pp., 8 x 11 ins. Illustrated. Deals with heating for large buildings.

The Fulton Sylphon Company, Knoxville, Tenn.
Sylphon Temperature Regulators. Illustrated brochures, 8½ x 11 ins., dealing with general architectural and industrial applications; also specifically with applications of special instruments.
Sylphon Heating Specialties. Catalog No. 200, 192 pp., 3½ x 6¼ ins. Important data on heating.

Grinnell Company, Providence, R. I.
Grinnell Discovers a Superior Heating Trap. Folder, 4 pp., 8½ x 11 ins. Illustrated.

Hoffman Specialty Company, Inc., 25 West 45th St., New York, N. Y.
Heat Controlled With the Touch of a Finger. Booklet, 46 pp., 5¾ x 8¾ ins. Illustrated.
How to Lock Out Air, the Heat Thief. Brochure, 48 pp., 5 x 7¼ ins. Illustrated.

Janette Manufacturing Company, 556 West Monroe Street, Chicago.
More Heat from Any Hot Water System on Less Fuel. Folder. 4 pp., 8½ x 11 ins. Illustrated. Deals with use of the "Hydrolator."

S. T. Johnson Co., Oakland, Calif.
Johnson Oil Burners. Booklet, 9 pp., 8½ x 11 ins. Illustrated.
Bulletin No. 4A. Brochure, 8 pp., 8½ x 11 ins. Illustrated. Data on different kinds of oil-burning apparatus.
Bulletin No. 31. Brochure, 8 pp., 8½ x 11 ins. Illustrated. Deals with Johnson Rotary Burner with Full Automatic Control.

Kewanee Boiler Corporation, Kewanee, Ill.
Kewanee on the Job. Catalog, 8½ x 11 ins., 80 pp. Illustrated. Showing installations of Kewanee boilers, water heaters, radiators. etc.
Catalog No. 78, 6 x 9 ins. Illustrated. Describes Kewanee Firebox Boilers with specifications and setting plans.
Catalog No. 79, 6 x 9 ins. Illustrated. Describes Kewanee power boilers and smokeless tubular boilers with specifications.

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SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—*Continued from page 188*

HEATING EQUIPMENT—Continued

McQuay Radiator Corporation, 35 East Wacker Drive, Chicago, Ill.
McQuay Visible Type Cabinet Heater. Booklet, 4 pp., 8½ x 11 ins. Illustrated. Cabinets and radiators adaptable to decorative schemes.
McQuay Concealed Radiators. Brochure, 4 pp., 8½ x 11 ins. Illustrated.
McQuay Unit Heater. Booklet, 8 pp., 8½ x 11 ins. Illustrated. Gives specifications and radiator capacities.

Modine Mfg. Co., Racine, Wisc.
Modine Copper Radiation. Booklet, 28 pp. 8½ x 11 ins. Illustrated. Deals with industrial, commercial and domestic heating.
A Few Short Years. Folder. 4 pp. 8½ x 11 ins. Illustrated. Heating for garages.
Dairy Plant Heating. Folder. 4 pp., 8½ x 11 ins. Illustrated.
Industrial Heating. Folder. 4 pp., 8½ x 11 ins. Illustrated.
Modine Unit Heater. Folder. 6 pp., 8½ x 11 ins. Illustrated.

Nash Engineering Company, South Norwalk, Conn.
Bulletin 85. Booklet. 12 pp. 10¾ x 7½ ins. Illustrated in color. Describes construction and operation of the Jennings Return Line Vacuum Heating Pump.
Bulletin 87. Brochure. 8 pp. 10¾ x 7½ ins. Illustrated in color. Deals with Sizes T and U Jennings Vacuum Heating Pump for 2500 and 5000 square feet equivalent direct radiation.
Bulletin 63. Booklet. 4 pp. 10¾ x 7½ ins. Illustrated. Describes in detail the Unit Type Motor Driven Jennings Condensation Pump.

National Radiator Corporation, Johnstown, Pa.
The Crimson Flame. Folder, 6 pp., 4½ x 7 ins. Illustrated.
Contento Brings Contentment to Your Home. Folder, 12 pp., 3½ x 6 ins. Illustrated.
National Jacketed Boiler. Folder. 4 pp., 8½ x 11 ins. Illustrated.
National Super-Smokeless Boiler. Folder, 4 pp., 8½ x 11 ins. Illustrated.
Aero, the National Radiator Sizes and Ratings. Booklet, 16 pp., 5 x 7⅞ ins. Illustrated.

Prometheus Electric Corporation, 360 West 13th St., New York.
Electric Heating Specialties. Booklet, 24 pages. 8½ x 11 ins. Illustrated. Specialties for heating, cooking, hospitals, organ lofts, etc.

Rome Brass Radiator Corporation, 1 East 42nd Street, New York.
Proof of the Pudding. Booklet, 24 pp., 8½ x 10½ ins. Illustrated. Describes Robras, 20-20 concealed-within-the-walls, lightweight, all-brass radiators.
Within the Walls. Brochure, 16 pp., 4 x 9 ins. Illustrated. Gives facts regarding modern, out-of-sight, lightweight, Robras 20-20 radiators.
Engineering Data. Booklet, 16 pp., 8½ x 10½ ins. Illustrated. Full data and tables to facilitate selection and installation of Robras 20-20 concealed radiators for steam, water and vapor heating systems.
Small Bathrooms Made More Spacious, Brochure, 4 pp. Illustrated. Gives descriptions, sizes and prices of Robras lightweight cabinet radiators to be installed under wash basins.

Rome Brass Radiator Corp., (Aul-Brass Heater Division) 1 East 42nd St., New York.
Aulbras Hot Water Heaters. Booklet, 12 pp., 8½ x 11 ins. Illustrated in color.

Sarco Company, Inc., 183 Madison Ave., New York City, N. Y.
Steam Heating Specialties. Booklet, 6 pp., 6 x 9 ins. Illustrated. Data on Sarco Packless Supply Valves and Radiator Traps for vacuum and vapor heating systems.
Equipment Steam Traps and Temperature Regulations. Booklet, 6 pp., 6 x 9 ins. Illustrated. Deals with Sarco Steam Traps for hospital, laundry and kitchen fixtures and the Sarco Self-contained Temperature Regulation for hot water service tanks.

Spencer Heater Co., Williamsport, Pa.
Catalog. Booklet, 20 pp., 6⅛ x 9 ins. Illustrated. Complete line of magazine feed cast iron sectional and steel tubular heaters.
Spencer Magazine Heaters, for Steam, Vapor or Hot Water. Brochure, 28 pp., 5¾ x 9 ins. Illustrated.
The Fire that Burns Uphill. Brochure, 24 pp., 6⅛ x 9¼ ins. Illustrated in color. Magazine feed heaters for steam, vapor and hot water heating.

B. F. Sturtevant Company, Hyde Park, Boston, Mass.
Tempervane Heating Units. Catalog 363. Booklet, 44 pp., 8½ x 11 ins. Illustrated. Data on "Heating Every Corner with Maximum Economy."

Trane Co., The, La Crosse, Wis.
Bulletin 14, 16 pp., 8½ x 10⅝ ins. Covers the complete line of Trane Heating Specialties, including Trane Bellows Traps, and Trane Bellows Packless Valves.
Bulletin 20. 24 pp., 8½ x 10⅝ ins. Explains in detail the operation and construction of Trane Condensation. Vacuum, Booster, Circulating, and similar pumps.
How to Cut Heating Costs. Booklet, 18 pp., 8½ x 11 ins. Illustrated.

HOISTS, TELESCOPIC

Gillis & Geoghegan, Inc. 535 West Broadway, New York.
G & G Telescopic Hoist. Booklet. 24 pp. 8½ x 11 ins. Illustrated complete data on hoists.
Ash Removal. Folder. 8½ x 11 ins. Illustrated. Hoists for removing ashes from basements.

HOSPITAL EQUIPMENT

The Frink Co., Inc., 369 Lexington Ave., New York City.
Catalog 426. 7 x 10 ins., 16 pp. A booklet illustrated with photographs and drawings, showing the types of light for use in hospitals, as operating table reflectors, linolite and multilite concentrators, ward reflectors, bed lights and microscopic reflectors, giving sizes and dimensions, explaining their particular fitness for special uses.

Holophane Company, 342 Madison Avenue, New York.
Lighting Specific for Hospitals. Booklet, 30 pp., 8½ x 11 ins. Illustrated.

The International Nickel Company, 67 Wall St., New York, N. Y.
Hospital Applications of Monel Metal. Booklet, 8½ x 11½ ins., 16 pp. Illustrated. Gives types of equipment in which Monel Metal is used, reasons for its adoption, with sources of such equipment.

Prometheus Electric Corporation, 360 West 13th St., New York.
Electric Heating Specialties. Booklet, 24 pages. 8½ x 11 ins. Illustrated. Specialties for heating, cooking, hospitals, organ lofts, etc.

Wilmot Castle Company, Union Trust Bldg., Rochester, N. Y.
The Hospital Sterilizer Data Sheets. Booklet, 16 pp., 8½ x 11 ins. Illustrated. Data on planning sterilizer installations.

HOTEL EQUIPMENT

Pick-Barth Company, Inc., Albert, 1200 West 35th St., Chicago, and 34 Cooper Square, New York.
Some Thoughts on Furnishing a Hotel. Booklet, 7½ x 9 ins. Data on complete outfitting of hotels.

INCINERATORS

Home Incinerator Co., Milwaukee, Wis.
The Decent Way. Burn it with Gas. Brochure, 30 pp., 5¼ x 7¼ ins., inside. Illustrated. Incinerator sanitation equipment for residence use.
A. I. A. File, 12 pp., 8¾ x 10¾ ins., inside. Suggestions for architect on incineration, showing installation and equipment.
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Blue Star Standards in Home Building. 16 pp., 5½ x 8½ ins., inside. Illustrated. Explaining fully the Blue Star principles, covering heat, incineration, refrigeration, etc.

Josam Mfg. Co., Michigan City, Ind.
Josam-Graver Incinerators. Folder, 4 pp., 8½ x 11 ins. Illustrated.

Kerner Incinerator Company, 715 E. Water St., Milwaukee, Wis.
Incinerators (Chimney-fed). Catalog No. 15 (Architect and Builders' Edition). Size 8½ x 11 ins., 16 pp. Illustrated. Describes principles and design of Kernerator Chimney-fed Incinerators for residences, apartments, hospitals, schools, apartment hotels, clubs and other buildings. Shows all standard models and gives general information and working data.
Sanitary Elimination of Household Waste. Booklet, 4 x 9 ins. 16 pp. Illustrated. Gives complete information on the Kernerator for residences.
Garbage and Waste Disposal for Apartment Buildings. Folder, 8½ x 11 ins., 16 pp. Illustrated. Describes principle and design of Kernerator Chimney-fed Incinerator for apartments and gives list of buildings where it has been installed.
Sanitary Disposal of Waste in Hospitals. Booklet, 4 x 9 ins., 12 pp. Illustrated. Shows how this necessary part of hospital service is taken care of with the Kernerator. Gives list of hospitals where installed.
The Kernerator (Chimney-fed) Booklet. Catalog No. 17, 20 pp., 8½ x 11 ins. Illustrated. Data on a valuable detail of equipment.

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Armstrong Cork & Insulation Co., Pittsburgh, Pa.
The Insulation of Roofs with Armstrong's Corkboard. Booklet. Illustrated. 7½ x 10½ ins., 32 pp. Discusses means of insulating roofs of manufacturing or commercial structures.
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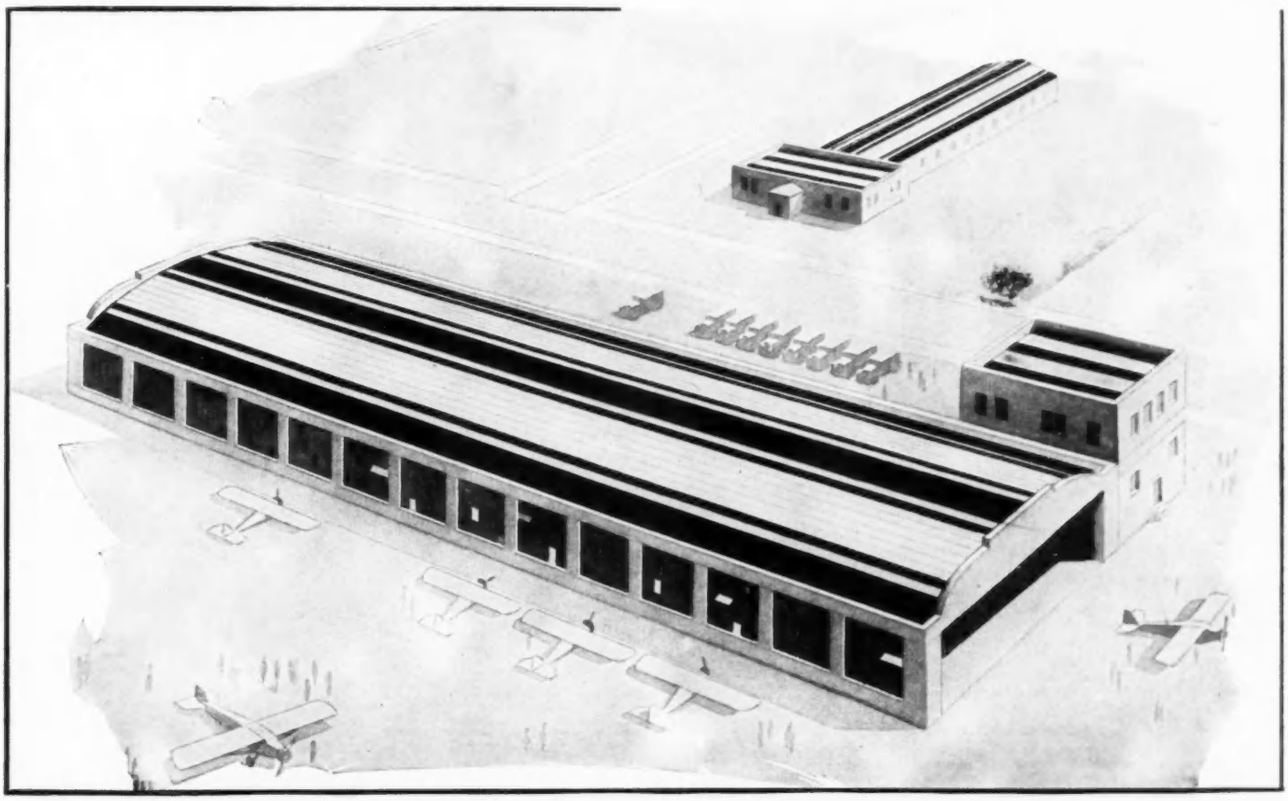

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INSULATION—Continued

Structural Gypsum Corporation, Linden, N. J.
Heat Insulation Value of Gypsteel. Folder, 4 pp., 8½ x 11 ins. Brochure, by Charles L. Norton, of M. I. T.

JOISTS

Concrete Steel Company, 42 Broadway, New York, N. Y.
Structural Economies for Concrete Floors and Roofs. Booklet, 32 pp., 8½ x 11 ins. Illustrated.

Modern Concrete Reinforcement. Brochure, 32 pp., 8½ x 11 ins. Illustrated.

Construction Details for Installing Havemeyer Trusses. Data sheets, 8½ x 11 ins. Illustrated.

Standard Practice for Placing Havemeyer Reinforcement in Columns, Beams and Slabs. Data sheets, 8½ x 11 ins. Illustrated.

KITCHEN EQUIPMENT

The International Nickel Company, 67 Wall St., New York, N. Y.
Hotels, Restaurants and Cafeteria Applications of Monel Metal. Booklet, 8½ x 11 ins., 32 pp. Illustrated. Gives types of equipment in which Monel Metal is used, with service data and sources of equipment.

Prometheus Electric Corporation, 360 West 13th St., New York.
Electric Heating Specialties. Booklet, 24 pages. 8½ x 11 ins. Illustrated. Specialties for heating, cooking, hospitals, organ lofts, etc.

John Van Range Co., Cincinnati.
Practical Planning for Church Food Service. Booklet, 32 pp., 8½ x 11 ins. Illustrated.

Practical Planning for Club Food Service. Booklet, 32 pp., 8½ x 11 ins. Illustrated.

Practical Planning for School Food Service. Booklet, 32 pp., 8½ x 11 ins. Illustrated.

Planning Restaurants That Make Money. Booklet, 78 pp., 8½ x 11 ins. Illustrated. Excellent work on equipment.

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Alberene Stone Co., 153 West 23rd Street, New York City.
Booklet, 8¾ x 11¼ ins., 26 pp. Stone for laboratory equipment, shower partitions, stair treads, etc.

Duriron Company, Dayton, Ohio.
Duriron Acid, Alkali and Rust-proof Drain Pipe and Fittings. Booklet, 8½ x 11 ins., 20 pp. Full details regarding a valuable form of piping.

LANTERNS

Todhunter, Inc., 119 East 57th St., New York, N. Y.
Lanterns. Booklet, 16 pp., 8½ x 11 ins. Illustrated. Deals with a fine assortment of fixtures for exterior and interior use.

LATH, METAL AND REINFORCING

Milwaukee Corrugating Co., Milwaukee
The Milcor Manual. Booklet, 96 pp., 8½ x 11 ins. Illustrated. Data on metal lath and similar materials.

Milcor Metal Ceiling Catalog. Booklet, 288 pp., 8½ x 11 ins. Illustrated. Data on metal ceiling and wall construction.

National Steel Fabric Co., Pittsburgh, Pa.
Better Walls for Better Homes. Brochure, 16 pp., 7¼ x 11¾ ins. Illustrated. Metal lath, particularly for residences.

Steeltex for Floors. Booklet, 24 pp., 8½ x 11 ins. Illustrated. Combined reinforcing and form for concrete or gypsum floors and roofs.

Steeltex Data Sheet No. 1. Folder, 8 pp., 8½ x 11 ins. Illustrated. Steeltex for floors on steel joists with round top chords.

Steeltex Data Sheet No. 2. Folder, 8 pp., 8½ x 11 ins. Illustrated. Steeltex for floors on steel joists with flat top flanges.

Steeltex Data Sheet No. 3. Folder, 8 pp., 8½ x 11 ins. Illustrated. Steeltex for folders on wood joists.

Truscon Steel Company, Youngstown, Ohio.
Truscon ¾-inch Hy-Rib for Roofs, Floors and Walls. Booklet, 8½ x 11 ins., illustrating Truscon ¾-inch Hy-Rib as used in industrial buildings. Plates of typical construction. Progressive steps of construction. Specification and load tables.

LAUNDRY MACHINERY

American Laundry Machinery Co., Norwood Station, Cincinnati, O.
Functions of the Hotel and Hospital Laundry. Brochure, 8 pp., 8½ x 11 ins. Valuable data regarding an important subject.

Laundry Equipment of Small Hotels, Hospitals and Institutions. Booklet, 36 pp., 8½ x 11 ins. Illustrated.

LAUNDRY MACHINERY—Continued

General Laundry Machinery Corporation, 608 South Dearborn St., Chicago, Ill.

General All-Metal Washer. Booklet, 16 pp., 8½ x 11 ins. Illustrated. Timken-equipped Monel metal washer with one-lever control.

General Dry Tumbler. Brochure, 16 pp., 8½ x 11 ins. Illustrated. Specifications and details of Up-Draft Dry Tumbler with automatic temperature control.

Troy Laundry Machinery Co., Inc., 9 Park Place, New York City.
Laundry Machinery for Large Institutions. Loose-Leaf booklet, 50 pp., 8½ x 11 ins. Illustrated.

Laundry Machinery for Small Institutions. Loose-leaf brochure, 50 pp., 8½ x 11 ins. Illustrated.

Accessory Equipment for Institutional Laundries. Leather bound book, 50 pp., 8½ x 11 ins. Illustrated.

Dry Cleaning Equipment for Institutional Purposes. Brochure, 50 pp., 8½ x 11 ins. Illustrated.

LIGHTING EQUIPMENT

The Frink Co., Inc., 369 Lexington Ave., New York, N. Y.
Catalog 415, 8½ x 11 ins., 46 pp. Photographs and scaled cross-sections. Specialized bank lighting, screen and partition reflectors, double and single desk reflectors and Polaralite Signs.

Gleason Tiebout Glass Company, 67 West 44th St., New York, N. Y.
Fragment of Celestialite. Booklet, 24 pp., 7 x 10 ins. Illustrated. Data on lighting for offices, schools, hospitals, etc.
Celestialite Catalog 727. Booklet, 18 pp., 8½ x 11 ins. Illustrated. Valuable brochure on lighting.

Holophane Company, Inc., 342 Madison Ave., New York, N. Y.
The Lighting of Schools; A Guide to Good Practice. Booklet. 24 pp., 8½ x 11 ins. Illustrated.

Lighting Specifications for Hospitals. Brochure, 30 pp., 8½ x 11 ins. Illustrated.

Industrial Lighting. Bulletin 448A. Booklet, 24 pp., 8½ x 11 ins. Illustrated.

Holophane Catalog. Booklet, 48 pp., 8½ x 11 ins. Combination catalog and engineering data book.

The Lighting of Schools. A Guide to Good Practice. Booklet, 24 pp., 8½ x 11 ins. Illustrated.

Smyser-Royer Co., 1700 Walnut Street, Philadelphia, Pa.
Catalog "J" on Exterior Lighting Fixtures. Brochure, illustrated, giving data on over 300 designs of standards, lanterns and brackets of bronze or cast iron.

Todhunter, 119 East 57th St., New York, N. Y.
Lighting Fixtures, Lamps and Candlesticks. 24 pp., 8½ x 11 ins. Illustrated. Fine assortment of lighting accessories.

Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.
Industrial Lighting Equipment. Booklet, 32 pp., 8½ x 11 ins. Illustrated.

Commercial Lighting. Brochure, 24 pp., 8½ x 11 ins. Illustrated.
Airport and Floodlighting Equipment. Booklet, 20 pp., 8½ x 11 ins. Illustrated.

MAIL CHUTES

Cutler Mail Chute Company, Rochester, N. Y.
Cutler Mail Chute Model F. Booklet, 4 x 9¼ ins., 8 pp. Illustrated.

MANTELS

Henry Klein & Co., Inc. 40-46 West 23rd Street, New York.
Driwood Mantels. Booklet. 12 pp. 8½ x 11 ins. Illustrated. Fine line of eighteenth century English and American mantels.

Todhunter, Inc., 119 East 57th St., New York, N. Y.
Georgian Mantels. Brochure, 12 pp., 8½ x 11 ins. Illustrated. Illustrates and describes an excellent assortment of fine mantels based on Georgian precedent.

MARBLE

The Georgia Marble Company, Tate, Ga.; New York Office, 1328 Broadway.
Why Georgia Marble Is Better. Booklet, 3⅛ x 6 ins. Gives analysis, physical qualities, comparison of absorption with granite, opinions of authorities, etc.

Convincing proof. 3⅛ x 6 ins., 8 pp. Classified list of buildings and memorials in which Georgia Marble has been used, with names of Architects and Sculptors.

Hurt Building, Atlanta; Senior High School and Junior College, Muskegon, Mich. Folders, 4 pp., 8½ x 11 ins. Details.

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TRUSCON

"O-T" OPEN TRUSS

STEEL JOISTS

The Central Savings & Loan Co., Youngstown, Ohio
Morris W. Scheibel, Architect; R. M. Johnson, Associate Architect
The Heller Brothers Co., Contractors

LIGHT WEIGHT—SIMPLICITY—ECONOMY

Features of this Modern, Fireproof Floor Construction

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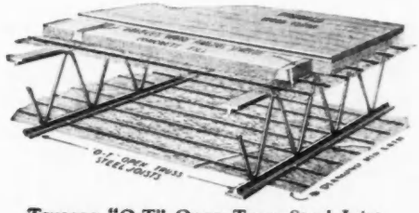
STEEL JOIST DIVISION
Warehouses and Offices in Principal Cities
Truscon Steel Company of Canada, Limited, Walkerville, Ontario



Truscon "O-T" Open Truss Steel Joist construction with finished floor of wood. ⅜" Diamond Rib Lath for floor and ceiling.

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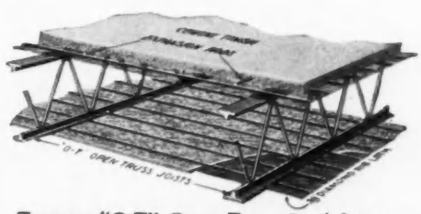

Truscon "O-T" Open Truss Steel Joist construction with cement floor finish. ⅜" Diamond Rib Lath for floor and ceiling.

SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—*Continued from page 192*

METALS

Aluminum Company of America, Pittsburgh.
Architectural Aluminum. Brochure, 30 pp., 8½ x 11 ins. Illustrated. An excellent booklet on the subject.

Central Alloy Steel Corporation, Massillon, Ohio.
Sheet Iron Primer. Booklet, 64 pp., 5¼ x 7¾ ins. Illustrated.

The Path to Permanence. Brochure, 52 pp., 8½ x 11 ins. Illustrated. Data on sheet iron.

The International Nickel Company, 67 Wall St., New York N. Y.
Monel Metal Primer. 8 folders, 4 pp., 8½ x 11 ins. Illustrated. Valuable data on use of monel in kitchens, laundries, etc.

MILL WORK—See also Wood

Curtis Companies Service Bureau, Clinton, Iowa.
Your Dream Kitchen, Booklet, 11 pp., 7¾ x 10½ ins. Illustrated. Fine line of fittings for kitchens, breakfast alcoves, etc.

Hartmann-Sanders Company, 2155 Elston Ave., Chicago, Ill.
Column Catalog, 7½ x 10 ins., 48 pp. Illustrated. Contains prices on columns 6 to 36 ins. diameter, various designs and illustrations of columns and installations.

The Pergola Catalog. 7½ x 10 ins., 64 pp. Illustrated. Contains illustrations of pergola lattices, garden furniture in wood and cement, garden accessories.

Klein & Co., Inc., Henry, 11 East 37th St., New York, N. Y.
Two Driwood Interiors. Folder, 4 pp., 6¼ x 9 ins. Illustrated. Use of moulding for paneling walls.

A New Style in Interior Decoration. Folder, 4 pp., 6¼ x 9 ins. Illustrated. Deals with interior woodwork.

Driwood Period Mouldings in Ornamented Wood. Booklet, 28 pp., 8½ x 11 ins. Illustrated.

How Driwood Period Mouldings in Ornamented Wood Set a New Style in Decoration. Folder.

Roddis Lumber and Veneer Co., Marshfield, Wis.
Roddis Doors. Brochure, 24 pp., 5¼ x 8½ ins. Illustrated price list of doors for various types of buildings.

Roddis Doors, Catalog G. Booklet, 184 pp., 8½ x 11 ins. Completely covers the subject of doors for interior use.

Roddis Doors for Hospitals. Brochure, 16 pp., 8½ x 11 ins. Illustrated work on hospital doors.

Roddis Doors for Hotels. Brochure, 16 pp., 8½ x 11 ins. Illustrated work on doors for hotel and apartment buildings.

MORTAR AND CEMENT COLORS

Clinton Metallic Paint Co., Clinton, N. Y.
Clinton Mortar Colors. Folder, 8½ x 11 ins., 4 pp. Illustrated in colors, gives full information concerning Clinton Mortar Colors with specific instructions for using them.

Color Card. 3¼ x 6½ ins. Illustrates in color the ten shades in which Clinton Mortar Colors are manufactured.

Something New in Stucco. Folder, 3½ x 6 ins. An interesting folder on the use of coloring matter for stucco coated walls.

PAINTS, STAINS, VARNISHES AND WOOD FINISHES

Minwax Company, Inc., 11 West 42nd St., New York.
Color Card and Specifications for Minwax Brick and Cement Coating. Folder, 4 pp., 8½ x 11 ins. Illustrated.

National Lead Company, 111 Broadway, New York, N. Y.
Handy Book on Painting. Book, 5½ x 3¼ ins., 100 pp. Gives directions and formulæ for painting various surfaces of wood, plaster, metals, etc., both interior and exterior.

Red Lead in Paste Form. Booklet. 6¼ x 3½ ins., 16 pp. Illustrated. Directions and formulæ for painting metals.

Came Lead. Booklet, 6 x 8¾ ins., 12 pp. Illustrated. Describes various styles of lead cames.

Sherwin-Williams Company, 601 Canal Rd., Cleveland, Ohio.
Complete Architectural Specifications for painting, varnishing and lacquering, reprinted from the Sherwin-Williams Architectural Catalogue as it appears in Sweet's Architectural Catalogue. Form Number B 303. 8½ x 11, bound in paper, thirty pages of specifications and color chips; carries A. I. A. file number.

Toch Brothers, New York, Chicago, Los Angeles.
Architects' Specification Data. Sheets in loose leaf binder, 8½ x 11 ins., dealing with an important line of materials.

PARTITIONS

Circle A. Products Corporation, New Castle, Ind.
Circle A. Partitions Sectional and Movable. Brochure. Illustrated. 8½ x 11¼ ins., 32 pp. Full data regarding an important line of partitions, along with Erection Instructions for partitions of three different types.

PARTITIONS—Continued

Irving Hamlin, Evanston, Ill.
Hamlinized Folding Partitions Made from Hamlin's Evanston Soundproof Doors, Sectional and Movable. Folder, 4 pp., 8½ x 11 ins. Illustrated.

Hauserman Company, E. F., Cleveland, Ohio.
Hollow Steel Standard Partitions. Various folders, 8½ x 11 ins. Illustrated. Give full data on different types of steel partitions, together with details, elevations and specifications.

Henry Klein & Co., 25 Grand Street, Elmhurst, L. I., N. Y.
Telesco Partition. Catalog, 8¼ x 11 ins., 14 pp. Illustrated. Shows typical offices laid out with Telesco partitions, cuts of finished partition units in various woods. Gives specifications and cuts of buildings using Telesco.

Detailed Instructions for Erecting Telesco Partitions. Booklet, 24 pp., 8½ x 11 ins. Illustrated. Complete instructions, with cuts and drawings, showing how easily Telesco Partition can be erected.

Improved Office Partition Co., 25 Grand St., Elmhurst, L. I., N. Y. (See Henry Klein & Co.)

Richards-Wilcox Mfg. Co., Aurora, Ill.
Partitions. Booklet, 7 x 10 ins., 32 pp. Illustrated. Describes complete line of track and hangers for all styles of sliding parallel, accordion and flush-door partitions.

Structural Gypsum Corporation, Linden, N. J.
Service Sheet No. 4. Specifications for Gypsteel Partition File. Folder, 8½ x 11 ins. Illustrated.

Telesco Office Partition, 25 Grand St., Elmhurst, L. I., N. Y. (See Henry Klein & Co.)

U. S. Gypsum Co., Chicago, Ill.
Pyrobar Partition and Furring Tile. Booklet, 8½ x 11 ins., 24 pp. Illustrated. Describes use and advantages of hollow tile for inner partitions.

PIPE

American Brass Company, Waterbury, Conn.
Bulletin B-1. Brass Pipe for Water Service. 8½ x 11 ins., 28 pp. Illustrated. Gives schedule of weights and sizes (I.P.S.) of seamless brass and copper pipe, shows typical installations of brass pipe, and gives general discussion of the corrosive effect of water on iron, steel and brass pipe.

American Rolling Mill Company, Middletown, Ohio.
How ARMCO Dredging Products Cut Costs. Booklet, 16 pp., 6 x 9 ins. Data on dredging pipe.

Clow & Sons, James B., 534 S. Franklin St., Chicago, Ill.
Catalog A. 4 x 16½ ins., 700 pp. Illustrated. Shows a full line of steam, gas and water works supplies.

Duriron Company, Dayton, Ohio.
Duriron Acid, Alkali, Rust-proof Drain Pipe and Fittings. Booklet, 20 pp., 8½ x 11 ins. Illustrated. Important data on a valuable line of pipe.

Maurice A. Knight, Akron, Ohio.
Knightware in the Princeton Chemical Laboratory. Booklet, 16 pp., 6¼ x 8½ ins. Illustrated.

National Tube Co., Frick Building, Pittsburgh, Pa.
"National" Bulletin No. 2. Corrosion of Hot Water Pipe, 8½ x 11 ins., 24 pp. Illustrated. In this bulletin is summed up the most important research dealing with hot water systems. The text matter consists of seven investigations by authorities on this subject.

"National" Bulletin No. 3. The Protection of Pipe Against Internal Corrosion, 8½ x 11 ins., 20 pp. Illustrated. Discusses various causes of corrosion, and details are given of the deactivating and deaereating systems for eliminating or retarding corrosion in hot water supply lines.

"National" Bulletin No. 25. "National" Pipe in Large Buildings. 8½ x 11 ins., 88 pp. This bulletin contains 254 illustrations of prominent buildings of all types, containing "National" Pipe, and considerable engineering data of value to architects, engineers, etc.

Modern Welded Pipe. Book of 88 pp., 8½ x 11 ins., profusely illustrated with halftone and line engravings of the important operations in the manufacture of pipe.

PLASTER

Best Bros. Keene's Cement Co., Medicine Lodge, Kans.
Information Book. Brochure, 24 pp., 5 x 9 ins. Lists grades of plaster manufactured; gives specifications and uses for plaster.

Plasterers' Handbook. Booklet, 16 pp., 3½ x 5½ ins. A small manual for use of plasterers.

Interior Walls Everlasting. Brochure, 20 pp., 6¼ x 9¼ ins. Illustrated. Describes origin of Keene's Cement and views of buildings in which it is used.

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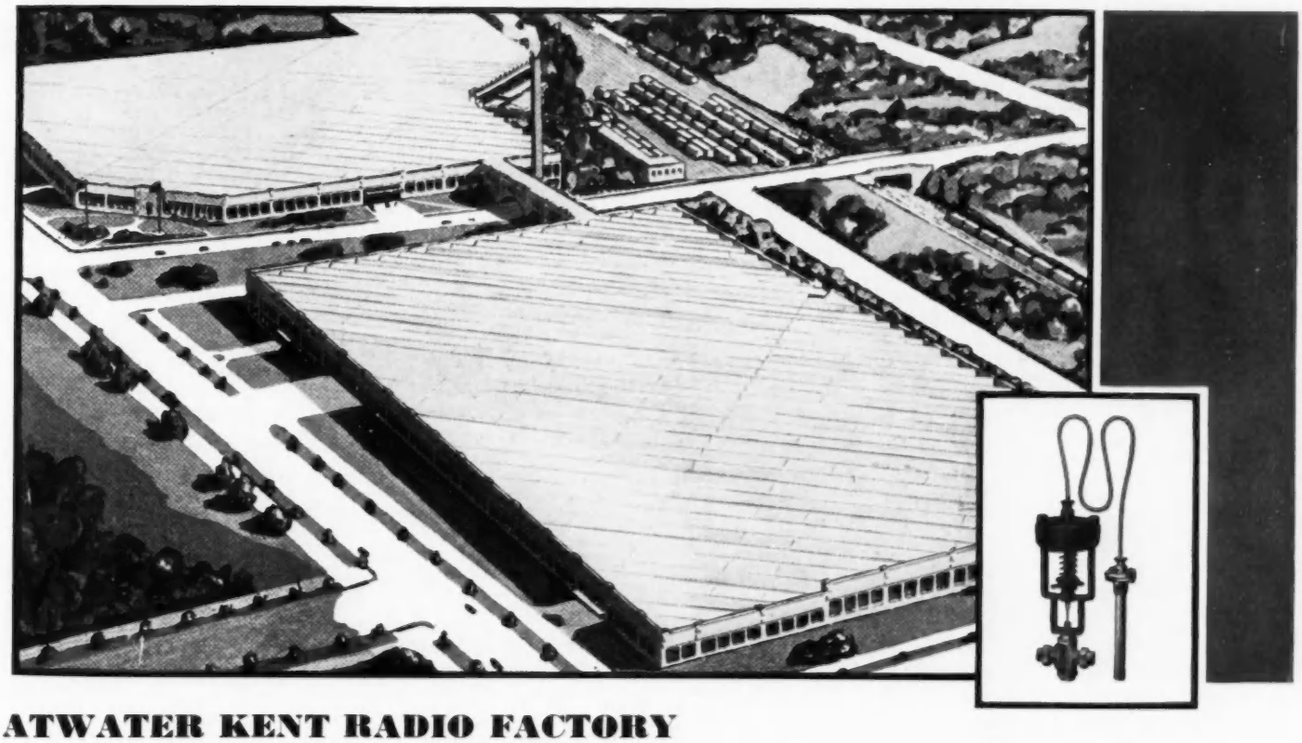

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The compactness of this regulator, and the fact that it can be installed in any position, makes it particularly desirable in industrial processes where one definite temperature is required from day to day. Furnished in valve size ½ in. to 2½ in. Write for literature.

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Canadian Representatives, Darling Brothers, Ltd., 140 Prince St., Montreal, Que., Canada

SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—*Continued from page 194*

PLUMBING EQUIPMENT

Clow & Sons, James B., 534 S. Franklin St., Chicago, Ill.
Catalog M. 9¼ x 12 ins., 184 pp. Illustrated. Shows complete line of plumbing fixtures for Schools, Railroads and Industrial Plants.

Crane Company, 836 S. Michigan Ave., Chicago, Ill.
Plumbing Suggestions for Home Builders. Catalog, 3 x 6 ins., 80 pp. Illustrated.

Plumbing Suggestions for Industrial Plants. Catalog, 4 x 6½ ins., 34 pp. Illustrated.

Planning the Small Bathroom. Booklet, 5 x 8 ins. Discusses planning bathrooms of small dimensions.

Duriron Company, Dayton, Ohio.
Duriron Acid, Alkali and Rust-Proof Drain Pipe and Fittings. Booklet, 8½ x 11 ins., 20 pp. Full details regarding a valuable form of piping.

Imperial Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill.
Watrous Patent Flush Valves, Duojet Water Closets, Liquid Soap Fixtures, etc. 8½ x 11 ins., 136 pp., loose-leaf catalog, showing roughing-in measurements, etc.

Speakman Company, Wilmington, Del.
Catalog K. Booklet, 150 pp., 8½ x 10⅞ ins. Illustrated. Data on showers and equipment details.

PNEUMATIC TUBE SYSTEMS

G & G Atlas Systems, Inc., 544 West Broadway, New York.
12 pp., 8½ x 11. Illustrated booklet of tube systems for retail stores and other buildings.

4 pp., 8½ x 11. Data Sheet showing schematic diagrams for hotel, bank, factory and wholesale buildings, table of sizes, space requirements and preliminary layout steps. A. I. A. 35h21.

PUMPS

Kewanee Private Utilities Co., 442 Franklin St., Kewanee, Ill.
Bulletin E. 7¾ x 10¾ ins., 32 pp. Illustrated. Catalog. Complete descriptions, with all necessary data, on Standard Service Pumps, Indian Brand Pneumatic Tanks, and Complete Water Systems, as installed by Kewanee Private Utilities Co.

Nash Engineering Company, South Norwalk, Conn.
Bulletin 52. Brochure. 6 pp., 10½ x 7¾ ins. Illustrated in color. Devoted to Jennings Standard Centrifugal Pumps for house service, boosting city water pressure to supply top stories, for circulating warm water, etc.

Bulletin 97. Booklet. 16 pp., 10½ x 7¾ ins. Illustrated in color. Describes the design, construction and operation of the Jennings Suction Sump Pump.

Bulletin 11. Brochure. 8 pp., 10½ x 7¾ ins. Illustrated in color. Deals with Nash Hytor Vacuum Pumps for air and gases.

The Trane Co., La Crosse, Wis.
Trane Small Centrifugal Pumps. Booklet, 3¾ x 8 ins., 16 pp. Complete data on an important type of pump.

Yeomans Brothers Company, 1433 Dayton Street, Chicago.
Yeomans Horizontally Split Case Centrifugal Pumps. Booklet, 12 pp., 8½ x 11 ins. Illustrated.

RAMPS

Ramp Buildings Corporation, 21 East 40th St., New York, N. Y.
Building Garages for Profitable Operation. Booklet, 8½ x 11 ins. 16 pp. Illustrated. Discusses the need for modern mid-city, parking garages, and describes the d'Humy Motoramp system of design, on the basis of its superior space economy and features of operating convenience. Gives cost analyses of garages of different sizes, and calculates probable earnings.

Garage Design Data. Series of informal bulletins issued in loose-leaf form, with monthly supplements.

REFRIGERATION

The Fulton Syphon Company, Knoxville, Tenn.
Temperature Control of Refrigeration Systems. Booklet, 8 pp., 8½ x 11 ins. Illustrated. Deals with cold storage, chilling of water, etc.

REINFORCED CONCRETE—See also Construction, Concrete

North Western Expanded Metal Company, Chicago, Ill.
Longspan ¼-inch Rib Lath. Folder, 4 pp., 8½ x 11 ins. Illustrated. Deals with a new type of V-Rib expanded metal.

REINFORCED CONCRETE—See also Construction, Concrete

Truscon Steel Company, Youngstown, Ohio.
Shearing Stresses in Reinforced Concrete Beams. Booklet, 8½ x 11 ins., 12 pp.

RESTAURANT EQUIPMENT

John Van Range Company, Cincinnati.
Planning Restaurants That Make Money. Booklet, 78 pp., 8½ x 11 ins. Illustrated. Excellent work on equipment.

ROOFING

Federal Cement Tile Co., 608 S. Dearborn Street, Chicago.
Catalog and Roof Standards. Booklet, 36 pp. 8½ x 11 ins. Illustrated. Describes Featherweight Concrete Insulating Roof Slabs, including complete data, weights and dimensions, specifications and detail drawings. Also includes complete information on Featherweight Nailing Concrete Roof Slabs for use with ornamental slate or copper covering. The catalog is profusely illustrated and contains also a partial list of users.

Examples of Theaters and Theater Roofs. Brochure, 16 pps., 8½ x 11 ins., Illustrated. Contains views of theaters designed by some of the country's leading architects.

Federal Interlocking Tile and Glass Tile. 4 pp., 8½ x 11 ins. Illustrates and describes complete roof or precast concrete slabs requiring no composition covering.

Heinz Roofing Tile Co., 1925 West Third Avenue, Denver, Colo.
Plymouth-Shingle Tile with Sprocket Hips. Leaflet, 8½ x 11 ins. Illustrated. Shows use of English shingle tile with special hips.

Italian Promenade Floor Tile. Folder, 2 pp., 8½ x 11 ins. Illustrated. Floor tiling adapted from that of Davanzati Palace.

Mission Tile. Leaflet, 8½ x 11 ins. Illustrated. Tile such as are used in Italy and Southern California.

Georgian Tile. Leaflet, 8½ x 11 ins. Illustrated. Tiling as used in old English and French farmhouses.

Johns-Manville Corporation, New York.
The New Book of Roofs. Brochure, 24 pp., 8½ x 11 ins. Illustrated. Roofing from the Architect's point of view.

Ludowici-Celadon Company, 104 So. Michigan Ave., Chicago, Ill.
"Ancient" Tapered Mission Tiles. Leaflet, 8½ x 11 ins., 4 pp. Illustrated. For architects who desire something out of the ordinary this leaflet has been prepared. Describes briefly the "Ancient" Tapered Mission Tiles, hand-made with full corners and designed to be applied with irregular exposures.

Milwaukee Corrugating Co., Milwaukee.
Milcor Architectural Sheet Metal Guide. Booklet. 72 pp., 8½ x 11 ins. Illustrated. Metal tile roofing, skylights, ventilators, etc.

Milcor Sheet Metal Handbook. Brochure. 128 pp., 8½ x 11 ins. Illustrated. Deals with rain-carrying equipment, etc.

Structural Gypsum Corporation, Linden, N. J.
Relative Effectiveness of Various Types of Roofing Construction in Preventing Condensation of the Under Surface. Folder, 4 pp., 8¾ x 11 ins. Important data on the subject.

Gypsteel Pre-cast Fireproof Roofs. Booklet, 48 pp., 8½ x 11 ins. Illustrated. Information regarding a valuable type of roofing.

U. S. Gypsum Co., Chicago, Ill.
Pyrobar Roof Construction. Booklet, 8 x 11 ins., 48 pp. Illustrated. Gives valuable data on the use of tile in roof construction.

Sheetrock Pyrofill Roof Construction. Folder, 8½ x 11 ins. Illustrated. Covers use of roof surfacing which is poured in place.

SCHOOL EQUIPMENT

John Van Range Co., Cincinnati.
Practical Planning for School Food Service. Booklet, 32 pp., 8½ x 11 ins. Illustrated.

SEWAGE DISPOSAL

Kewanee Private Utilities, 442 Franklin St., Kewanee, Ill.
Specification Sheets. 7¾ x 10¾ ins., 40 pp. Illustrated. Detailed drawings and specifications covering water supply and sewage disposal systems.

Nash Engineering Company, South Norwalk, Conn.
Bulletin 67. Booklet. 16 pp. 10¾ x 7½ ins. Illustrated in color. Describes Type A Jennings Sewage Ejector for handling Unscreened sewage and raising it from basements below sewer level.

Bulletin 103. Brochure. 16 pp. 10¾ x 7½ ins. Illustrated in color. Deals with small size Type B Jennings Sewage Ejector.

Yeomans Brothers Company, 1433 Dayton Street, Chicago.
The Shone System of Pneumatic Sewage Ejectors (Screenless). Brochure. 20 pp., 8½ x 11 ins. Illustrated.

Yeomans Heavy Duty Screenless Submerged Type Sewage Ejectors. Booklet. 12 pp., 8½ x 11 ins. Illustrated.

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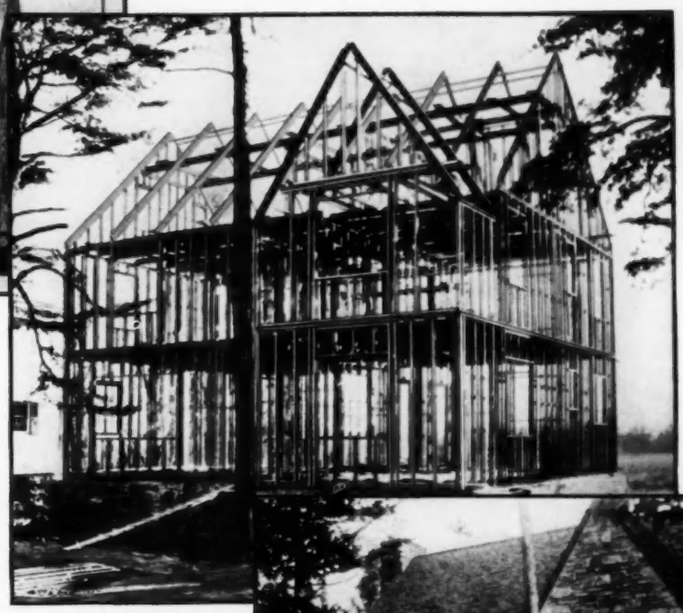

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IT MAKES no difference what kind of house you are planning. MacMar Steel Framing is adaptable to it. That is one reason why architects endorse so strongly this modern method of construction. For MacMar Steel Framing imposes no limitations on design, no necessity of clinging to commonplace types. When you plan a house, and specify MacMar construction, you know that the house will be built exactly according to your design. Every dimension in the finished house coincides with your original plan to the fraction of an inch.

Why? Because the rigid steel framework of your house is fabricated at the mill. Uprights and floor beams are cut to the correct lengths. Every member of the framework comes marked to designate its final position in the house. All chance of errors in proportion—and consequent altering of your design—are eliminated.

And MacMar Steel Framing offers other striking advantages, too. Speed and simplicity of erection, for example—no special experience—no special tools required. Permanence—an absolute rigidity of construction that conquers sagging, settling and plaster cracks. Safety—against fire, storm, and weather. And astonishing slow depreciation—this perhaps the greatest advantage of all. Let us send you full information about MacMar Steel Framing—the better framework for dwellings of any design. Write us today.

Mac-Mar STEEL FRAMING

The modern method of house construction

STEEL FRAME HOUSE CO. *Subsidiary of* McClintic-Marshall Corp. OLIVER BLDG., PITTSBURGH

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SCREENS

American Brass Co., The, Waterbury, Conn.
Facts for Architects About Screening. Illustrated folder, 9½ x 11¾ ins., giving actual samples of metal screen cloth and data on fly screens and screen doors.

Athey Company, 6015 West 65th St., Chicago, Ill.
The Athey Perennial Window Shade. An accordion pleated window shade, made from translucent Herringbone woven Coutil cloth, which raises from the bottom and lowers from the top. It eliminates awnings, affords ventilation, can be dry-cleaned and will wear indefinitely.

SHELVING-STEEL

David Lupton's Sons Company, Philadelphia, Pa.
Lupton Steel Shelving. Catalog E. Illustrated brochure, 40 pp., 8½ x 11 ins. Deals with steel cabinets, shelving, racks, doors, partitions, etc.

STEEL PRODUCTS FOR BUILDING

Bethlehem Steel Company, Bethlehem, Pa.
Steel Joists and Stanchions. Booklet, 72 pp., 4 x 6¾ ins. Data for steel for dwellings, apartment houses, etc.

Steel Frame House Company, Pittsburgh, Pa. (Subsidiary of McClintic-Marshall Corp.)
Steel Framing for Dwellings. Booklet, 16 pp., 8½ x 11 ins. Illustrated.
Steel Framing for Gasoline Service Stations. Brochure, 8 pp., 8½ x 11 ins. Illustrated.
Steel Frame Standard Gasoline Service Stations. Booklet, 8 pp., 8½ x 11 ins. Illustrated. Three standard designs of stations.

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
The Arc Welding of Structural Steel. Brochure, 32 pp., 8½ x 11 ins. Illustrated. Deals with an important structural process.

STONE, BUILDING

Indiana Limestone Company, Bedford, Ind.
Volume 3, Series A-3. Standard Specifications for Cut Indiana Limestone work, 8½ x 11 ins., 56 pp. Containing specifications and supplementary data relating to the best methods of specifying and using this stone for all building purposes.
Volume 1. Series B. Indiana Limestone Library, 6 x 9 ins., 36 pp. Illustrated. Giving general information regarding Indiana Limestone, its physical characteristics, etc.
Volume 4. Series B. Booklet. New Edition, 8½ x 11 ins., 64 pp. Illustrated. Indiana Limestone as used in Banks.
Volume 5. Series B. Indiana Limestone Library. Portfolio, 11¾ x 8¼ ins. Illustrated. Describes and illustrates the use of stone for small houses with floor plans of each.
Volume 6. Series B. Indiana Limestone School and College Buildings. 8½ x 11 ins., 80 pp. Illustrated.
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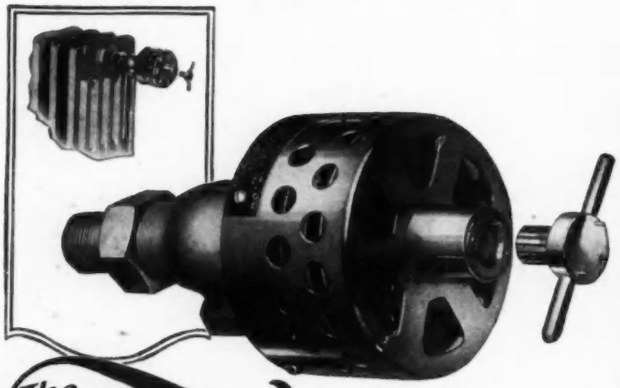

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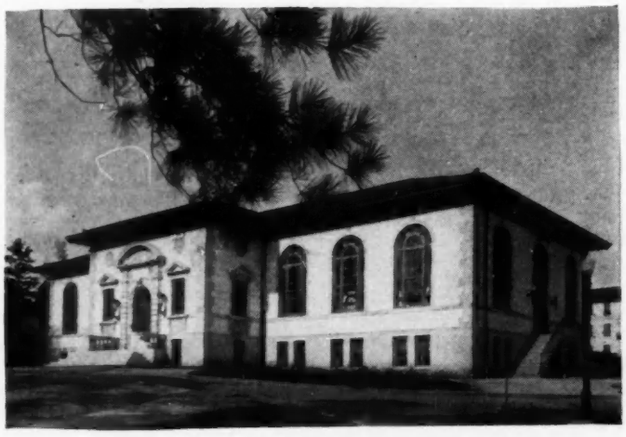

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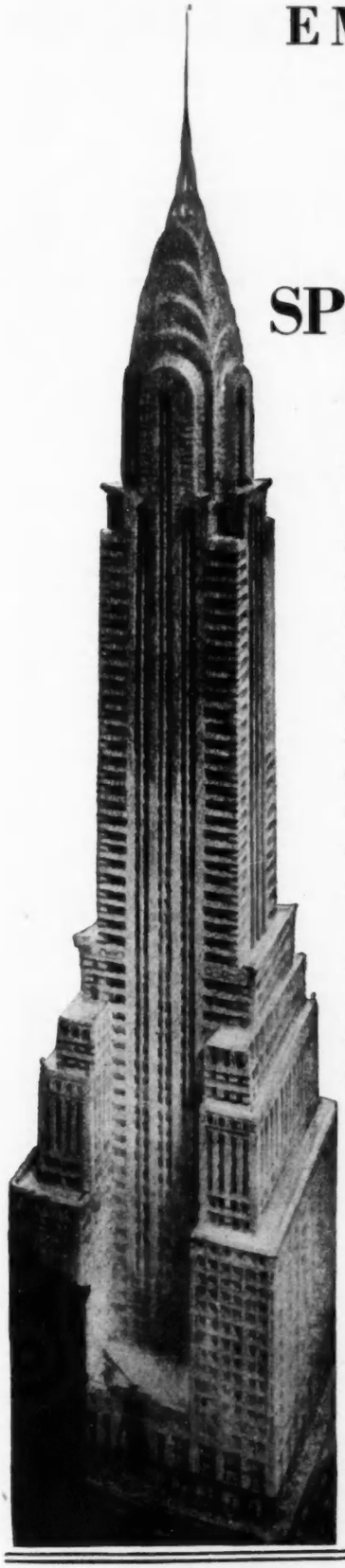

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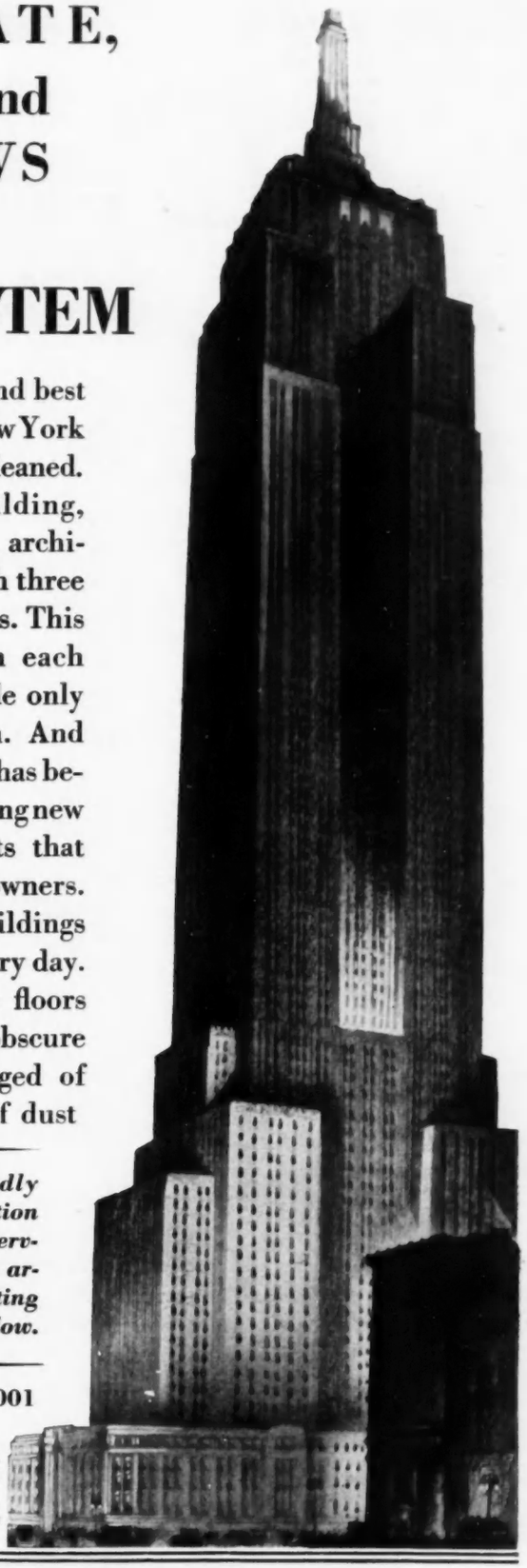

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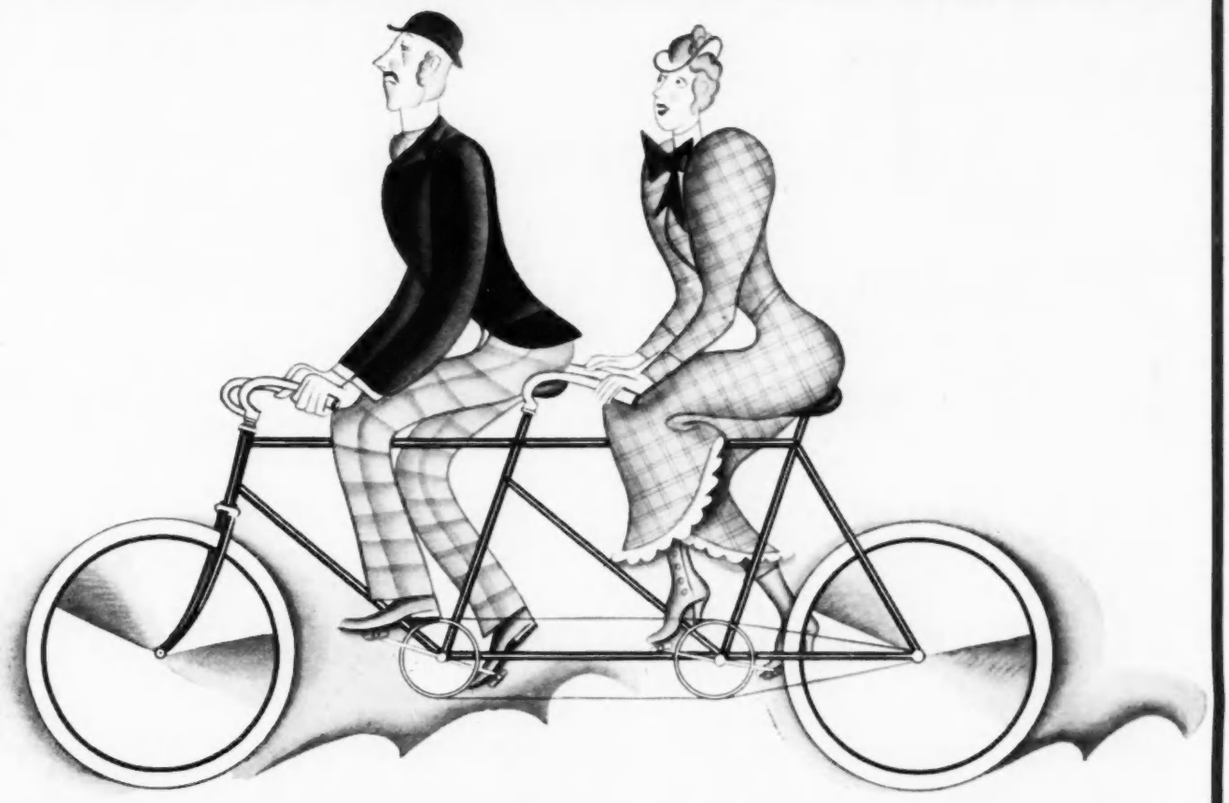

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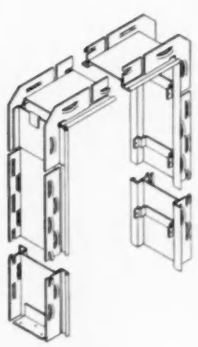

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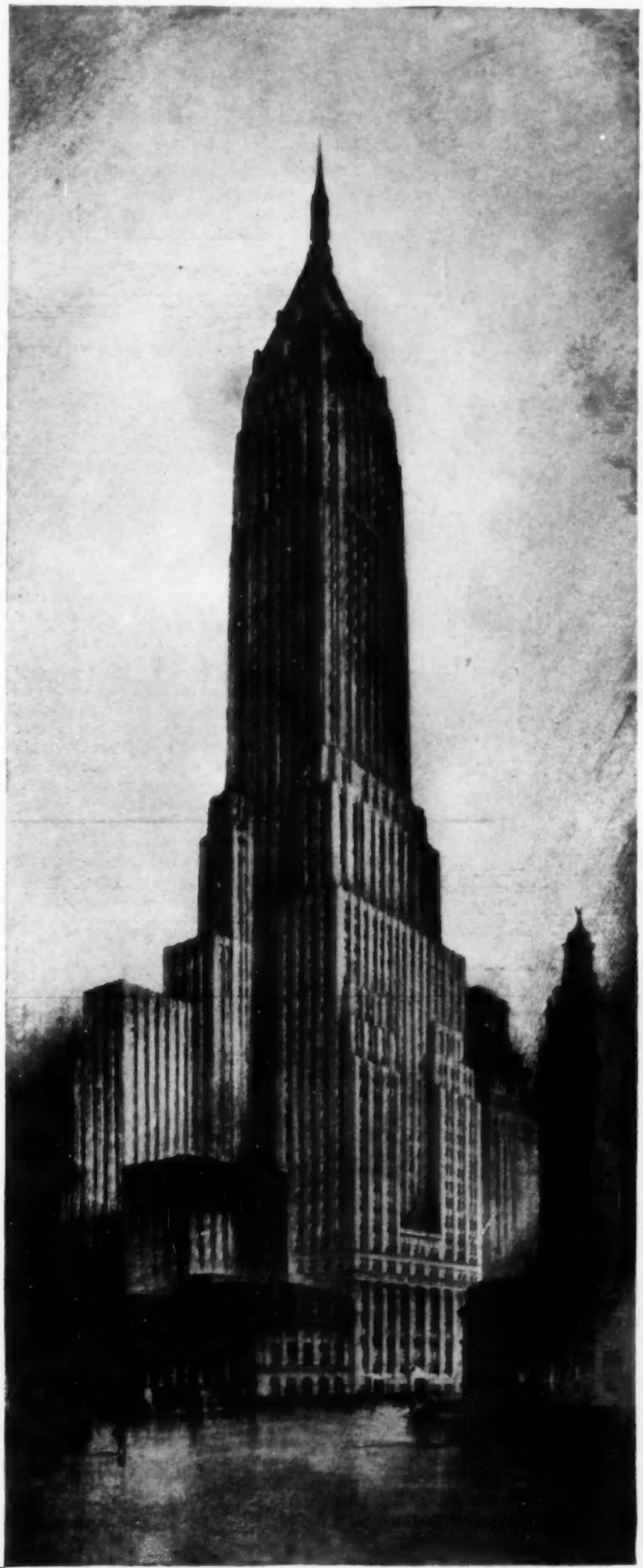

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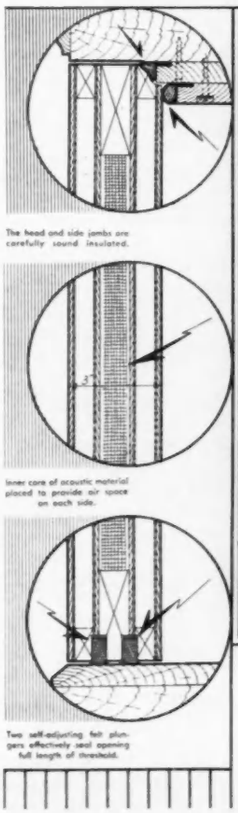
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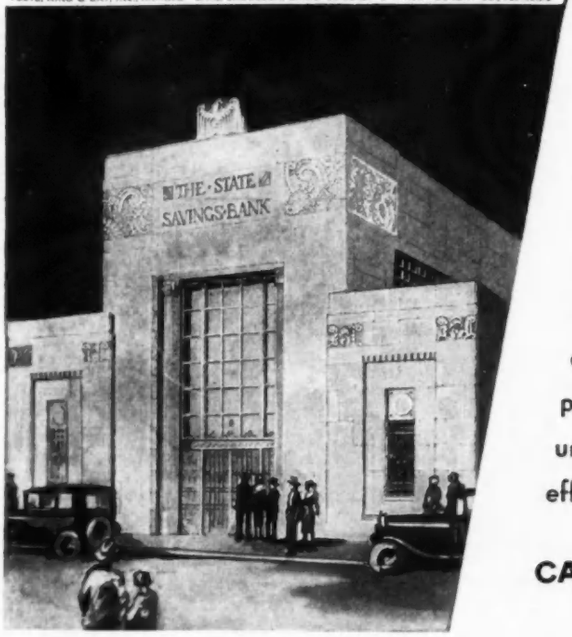

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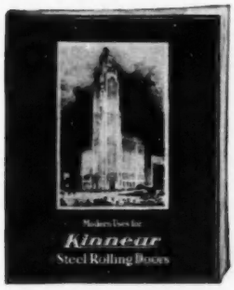

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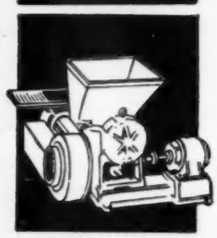

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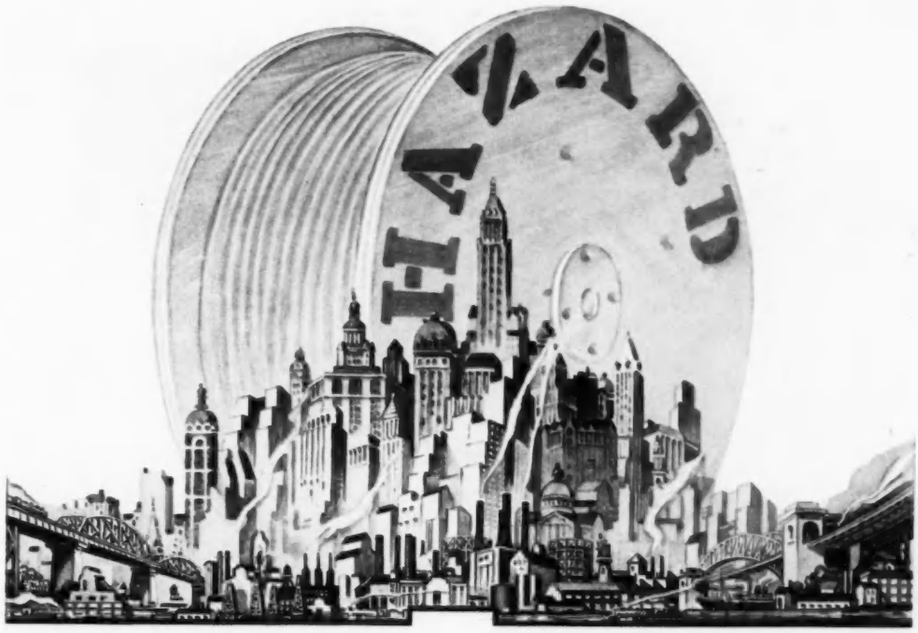

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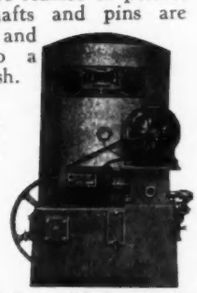

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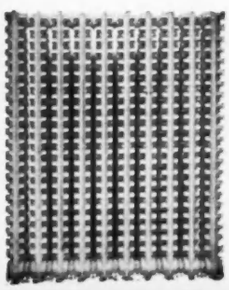

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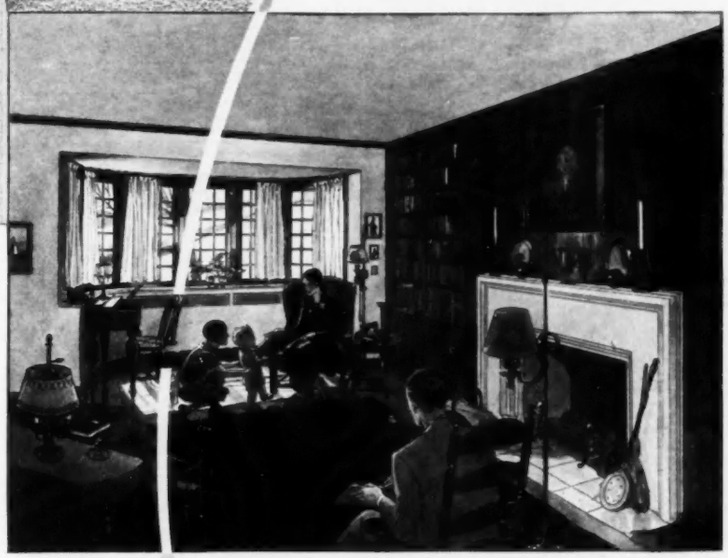

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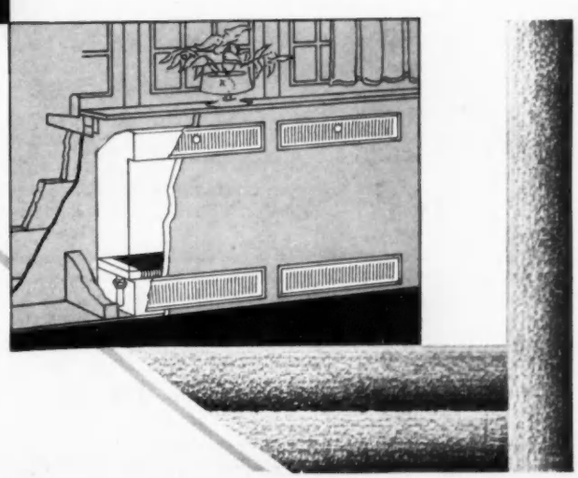

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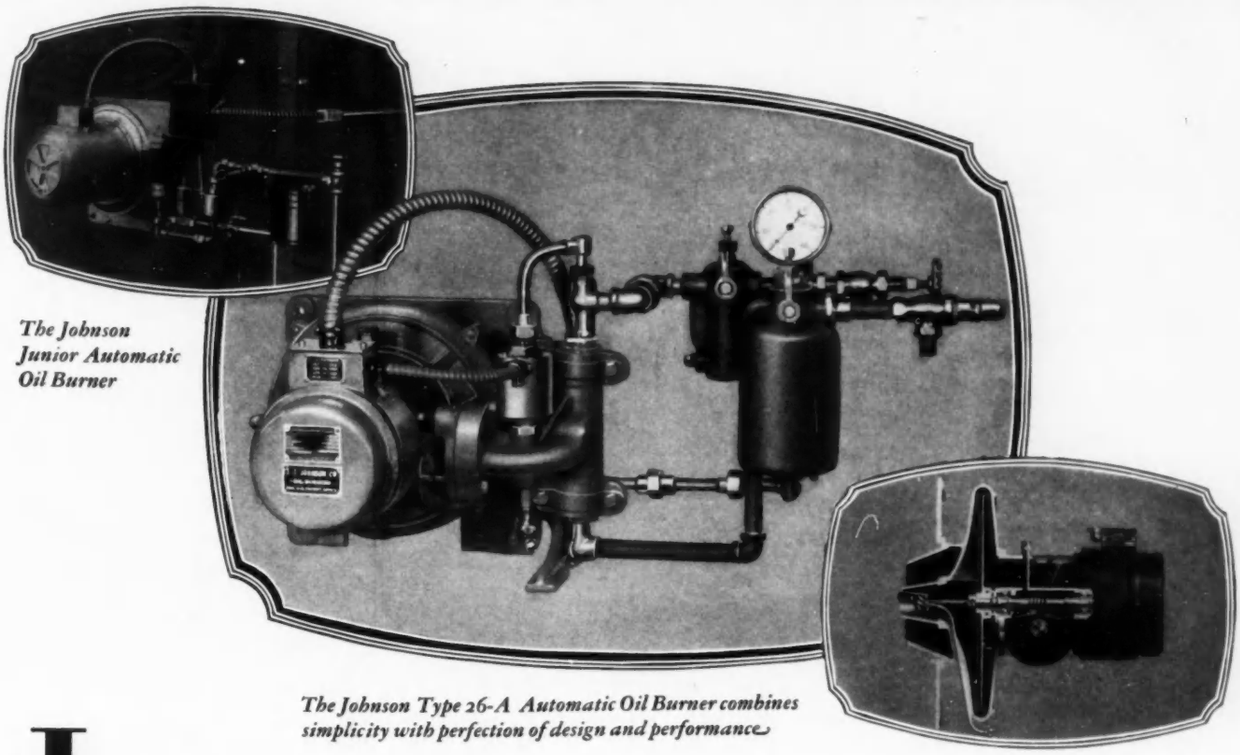

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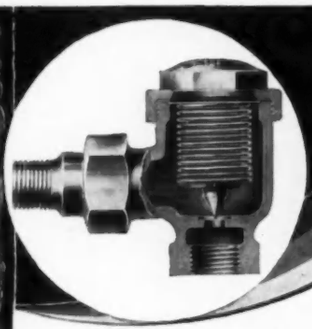

WHY

architects and contractors are so exceedingly careful in buying

Someone buries a doctor's mistakes, and hangs a lawyer's mistakes. But an architect, engineer or contractor has to live his down. And no building seems to stand so long as the one that has something wrong with it.

Have you ever wondered why so many specifications of fine, big hotels, apartment houses, hospitals, business buildings and such call for Sarco Radiator Traps throughout? If so, ask the men who specify and buy many radiator traps. You will find that they specify Sarco Traps because:

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. . . The body is heavy bronze, heavily nickeled—a strong, handsome trap.

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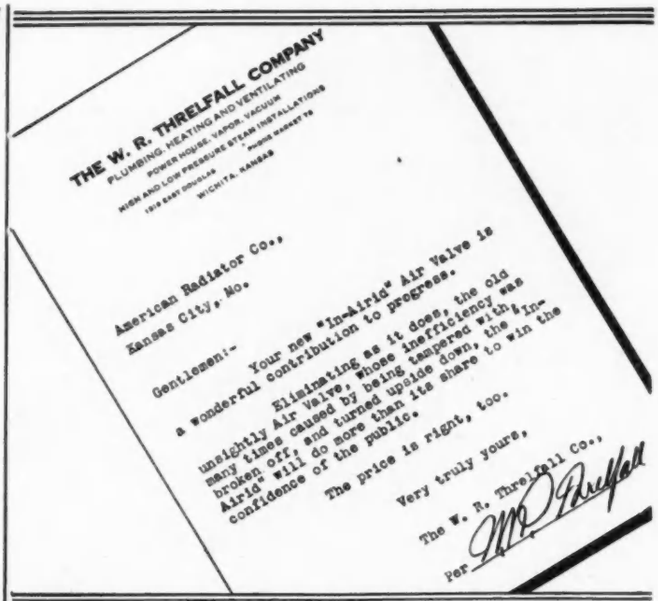

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Your new "In-Airid" Air Valve is a wonderful contribution to progress.

Eliminating as it does, the old unsightly Air Valve, whose inefficiency was many times caused by being tampered with, broken off, and turned upside down, the In-Airid will do more than its share to win the confidence of the public.

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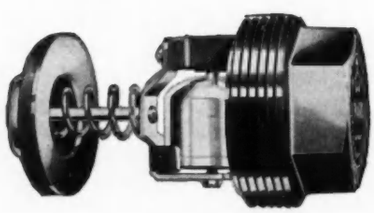

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Makers of a complete line of Valves, Vents and Regulators

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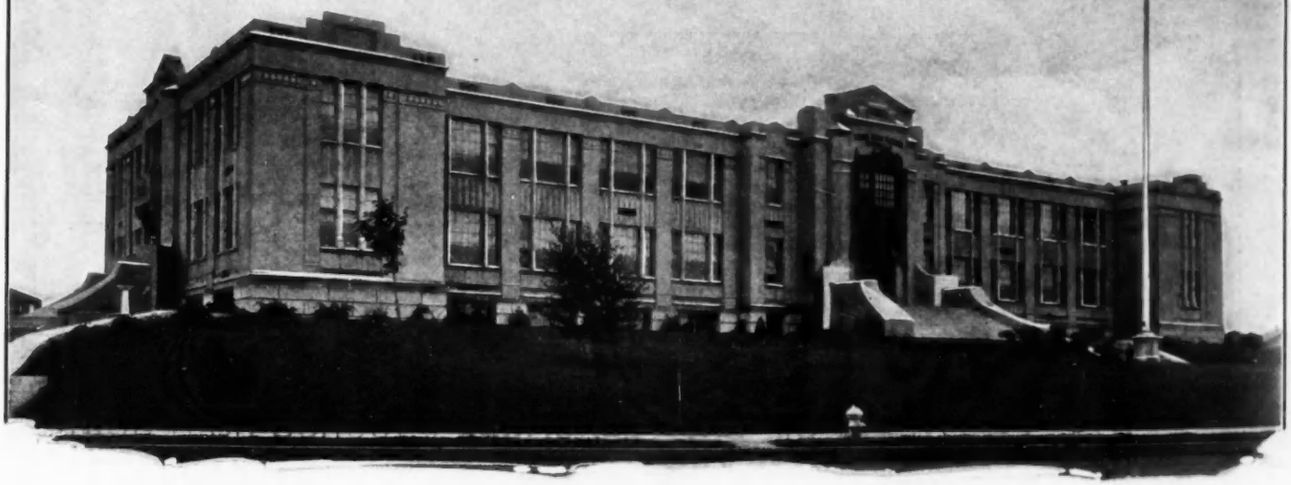

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MAKE it a point to visit some of the schools where PeerVent Units are in use and see for yourself how quietly and efficiently these units operate under varying conditions—It will be a revelation to you—Also, remove the front panel from one of these units and look inside—see the new PeerFin Radiator—the silent-running motor—the air filter—the mixing damper. Then you will realize that PeerVent Units are more than mechanical equipment.

PeerVent Units have a proven durability. Units built and installed 18 years ago are still in use and operating satisfactorily.

Based on correct ventilation principles, PeerVent Units ensure a more even temperature than ordinary types of heating systems. When properly installed with correctly located air inlets, PeerVent Units will keep the floor temperature in the schoolroom within 2 degrees of the temperature at the breathing line. With ordinary heating systems this temperature variation is often as much as 10 degrees. PeerVent Units are economical. As each unit is independent from those in other rooms, only the units in occupied rooms need be operated.

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EVERY architect will welcome this new collection of 100 charming examples of the work of fifty of the leading designers of residences. They include the latest developments in house work in all the architectural styles and as built in all sections of the country.

Photographs and floor plans of every house are given with numerous interior views. Each year marks a further advancement in the beauty, comfort and utility of the American Country House, and this new work is full of helpful suggestions that will make it worth many times its price.

210 Pages, 9½ x 12½ Inches, 250 Figures. Cloth. Price $12.50 Postpaid

Chamberlain's Sketches—Domestic Architecture in Rural France

A PORTFOLIO of fifty-six full page sketches in lithograph, drypoint, pencil and wash, size 9¾ by 12¾ inches, containing a most extensive collection of hitherto unpublished material on domestic architecture, gathered from the four corners of France. They include small chateaux, farms, town houses, cottages, manoirs, wind-mills, gates, doorways, details, etc., from Bergundy, Auverne, Provence, Normandy, Brittany and the Touraine.

The value of these drawings is enhanced by their scrupulous accuracy of detail and proportion. As examples of pencil technique, they are undoubtedly the most delightful things this artist has done.

Among the more than 250 subjects illustrated, considerable space has been given to measured drawings of ironwork, to details of doorways and to many groups of cottages, manoir houses and unpretentious chateaux. Varied interpretations of the use of stone, brick and timber are fully illustrated.

63 Plates. 9¾ x 12¾. Portfolio Price $12.50

Californian Architecture in Santa Barbara

DERIVING its chief inspiration directly or indirectly from Latin types which developed under similar climatic conditions along the Mediterranean, or at points in Mexico and California, this new book illustrates, with two hundred and fifty photographs of exteriors, interiors, details, and plans, a style now become "as distinctive as any single character of structure found in the United States today."

Divided into six groups — Historic Houses — Public Building — Churches, Clubs and Theatres—Commercial Buildings—Residences—and Small Houses—the book conclusively demonstrates the charming manner in which good architecture has been extended to all types of buildings in Santa Barbara.

This is a valuable addition to any architect's library.

133 Pages, 9½ x 12½ Inches. Cloth bound. Price $7.50

Cottages, Farmhouses, and Other Minor Buildings in England

EVERY architect should have Louis Conrad Rosenburg's splendid collection of photographs, measured drawings and charming pencil sketches of farmhouses and cottages in rural England, dating from the Tudor Period, the 17th and the 18th centuries.

The various types of buildings have been selected with special reference to their development through the use of local building materials in the counties of Surrey, Sussex, Kent, Suffolk, Norfolk, Oxfordshire, Warwickshire, Wiltshire and Northamptonshire.

The book is illustrated by one hundred photographs, twenty-five sheets of measured drawings, and twenty-five full page pencil sketches of exteriors, interiors, doors, fireplaces, chimneys, windows, etc.

122 Pages, 9½ x 12½ Inches. Cloth. Only $10.00

Any of these books will be sent postpaid by

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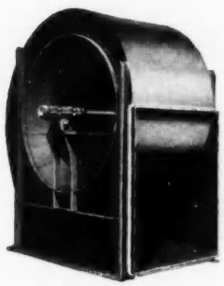

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REVIEWS OF MANUFACTURERS' PUBLICATIONS

DAVID LUPTON'S SONS CO., Philadelphia. "Lupton Casements, the Standard of Quality." Valuable work on their use.

When one thinks of casement windows it is usually in connection with structures of a residence character, and yet the advantages which procure for windows of this type wide use in residences or apartment buildings are quite as applicable to structures of other types. This booklet from the well known Lupton firm contains illustrations showing use of its casements in buildings or structures of a distinctly non-residence nature,—the Memorial Municipal Building, Norwood, Mass.; the Masonic Temple, Detroit; Maricopa Court House, Phœnix, Ariz.; Public Auditorium, Cleveland, and it might not have been difficult to include illustrations of office buildings in which they are used. The brochure contains every detail of data in the form of diagrams and other drawings as well as in text which an architect, engineer or builder would be likely to require, and complete specifications are included for use of the various kinds of Lupton casements.

DIEBOLD SAFE & LOCK CO., Canton, Ohio. "Protection for Cash With Diebold Money Chests."

Securing safety for treasure of any kind has engaged the attention of the human race from time immemorial. The pyramids, built as tombs for the treasured bodies of sovereigns, represented an effort to obtain by sheer bulk and vast weight inviolability which was absolute,—and yet how frail has such protection proved to be! Countless have been the efforts made during even modern times to secure safety for treasure, and yet the ingenuity of men has time and time again baffled the builders of the strongest protection and triumphed over the designers of some treasure vault built upon the most advanced plan as the efforts of builders have been met with equal if not greater ingenuity of men whose business it is to frustrate their efforts. It may be doubted whether it is possible to secure absolute safety if there be no account taken of time or certain other controlling factors; it would seem that the day is not yet. This brochure presents an interesting study into the matter of securing protection not only from theft but also from fire. It has a particular value just now because with the increase in the number of chain stores of different sorts where considerable cash must be kept on the premises, and with the extensive use of the devices by means of which merchandise of certain kinds is had by putting coins into slots, there is presented temptation of the strongest sort to those whose business it is to tap the sources of wealth.

Written as applicable to danger from fire but apropos also to some extent of danger from theft, this booklet has this to say: "1. *You Are Buying Protection Free From Speculation.* No safe expert can accurately forecast the duration or intensity of the fire which may some day visit your plant or office. A one- or two-hour safe may seem to furnish more than adequate protection in a 'fire-proof' building. Yet fires spreading from adjoining buildings or caused by the carelessness of your own employes, may ignite interior trim, wooden desks, files or inflammable stores, resulting in a fire of great intensity and several hours' duration. The only sure protection is a safe that will meet your maximum fire hazard. 2. *You Are Buying Protection That Safeguards Vital Assets.* Your business records represent vital assets, because the present operation and the future prosperity of your business are dependent upon them. Accounts receivable, cost records, research data, patent models, master tracings, audit data, sales reports, prospect lists, insurance policies, contracts,—without them you would be forced to start at the bottom and practically rebuild your business. They are too valuable to be destroyed, because you think a fire can't last for more than two hours. It can. A four-hour safe will protect your records against all reasonable risks. 3. *You Are Buying Protection Unaffected by Contingencies.* Every building represents a different degree of fire risk. Even those designated as 'fireproof' differ widely in their fire-resistive qualities, and many contain hidden fire hazards. You can insure your physical assets against unforeseen dangers, but you cannot insure your vital records. Small defects in construction of heating systems, foundations, or wall supports may become of first importance in case of fire."

WESTINGHOUSE ELECTRIC & MFG. CO., East Pittsburgh. "Waste! A Publication in the Interest of Elimination."

Perhaps it is because nature has been so lavish in her gifts to America that Americans are, it is said, the most wasteful people in the world. In a restaurant, for example, one sees people order entire steaks, eat a few mouthfuls and leave the rest, which is no doubt thrown out and wasted,—and this while in other parts of the world people are dying of starvation. The thrifty French, for example, could feed one entire family and perhaps more with what is wasted in one American home. President Wilson during the World War preached in and out of season what he called the "gospel of the clean plate."

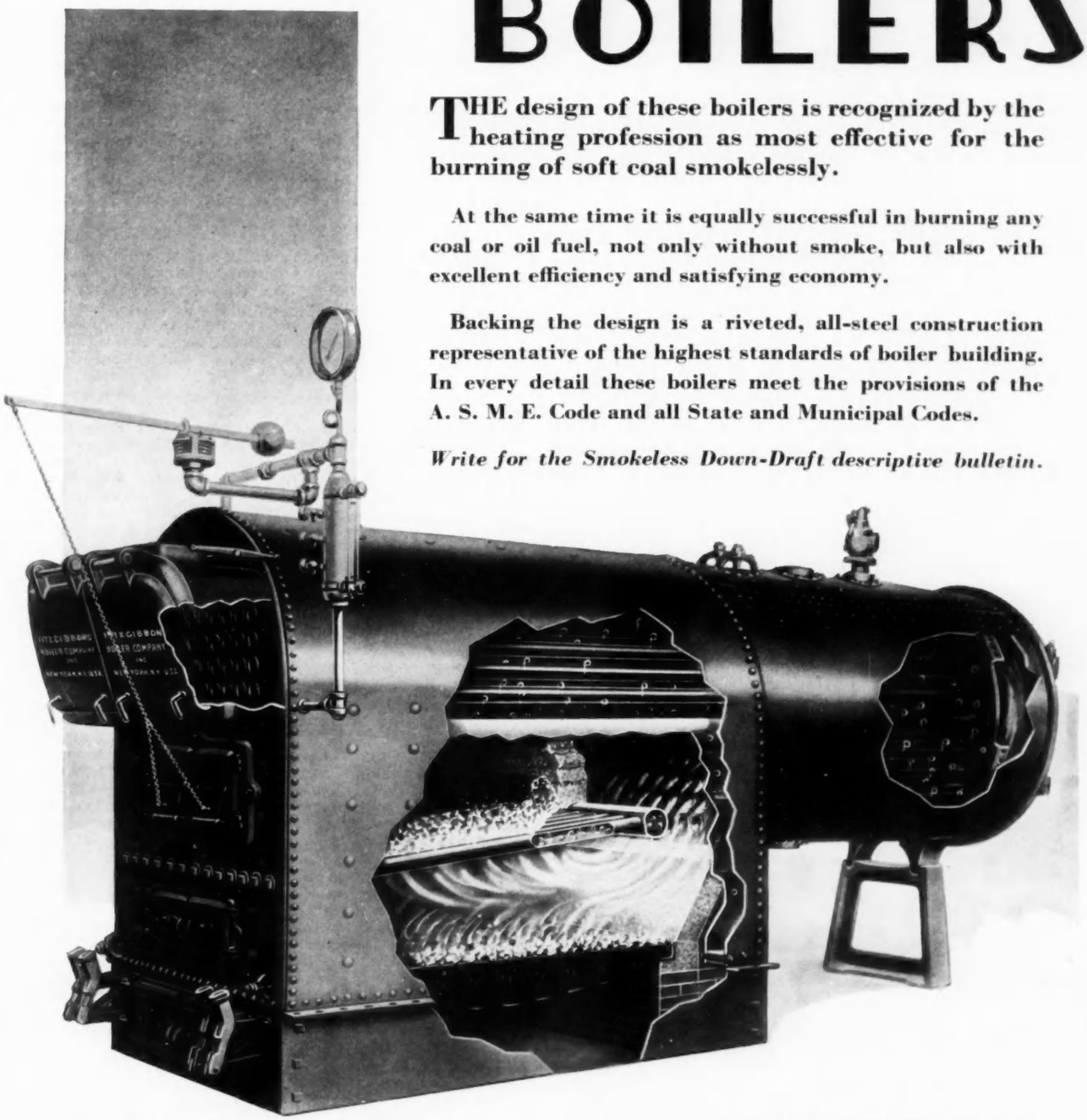
"We are a wasteful nation, but increasing competition, both at home and abroad, is awakening us to a realization of the fact that if the United States is to retain its present supreme position in the world, waste elimination and prevention must become a nation-wide habit. Ever since so-called scientific management was introduced, our industries have been giving more or less attention to waste and, while at first, as was but natural, each concern worked more or less independently, the tendency in recent years has been to exchange ideas, the better to attack this common problem. In an attempt to coördinate these various independent efforts, several years ago, five of the important management associations of the United States,—the Management Division of the American Society of Mechanical Engineers, the American Management Association, the Taylor Society, the Society of Industrial Engineers, and the National Association of Cost Accountants, with the coöperation later of the Department of Commerce and the United States Chamber of Commerce,—instituted an annual movement as 'National Management Week.' Organizations of all kinds were asked to devote at least one meeting to a discussion of some phase of management's problems, and this movement was continued until superseded by the Annual Elimination of Waste Campaign, sponsored by the American Society of Mechanical Engineers with the American Management Association cooperating, both prepared to give attention to the movement.

"Many different methods may be employed in conducting a campaign, one of the most effective being the exhibition, on suitable display boards or tables, of various materials that have been wasted due to careless handling, defective machining, wrong ordering, etc. The cost or sales price of each item should be shown with the piece exhibited. The better class of worker realizes that materials cost money, but the careless, indifferent element never stop to think of the cost of materials they are using, and placing the value on the Waste Elimination Boards causes them to realize what it costs when it is necessary to scrap something. Such items as gas, electricity, air, water, steam, etc., which cannot be shown, may readily be indicated by suitable legends such as, for example, 'Our power and light cost is $75 per month. Please keep motors and lights shut off when not in use.' Another valuable adjunct to a Waste Elimination Campaign is a 'suggestion system.' Workmen can in this way be encouraged to submit suggestions covering all sorts of activities, including elimination of waste, and thus a rich source is developed from which are obtained practical ideas for both shops and offices. After a suggestion system is installed, arrangements should be made to continue it indefinitely; that is, it should not be merely incidental to an intensive waste campaign if the maximum benefits are to be secured and if we are really to see an end of waste.

"Elimination and prevention of waste apply not only to the reduction of the scrap pile but can include the substitution of cheaper for more expensive materials as well,—quality being satisfactory for the purpose intended. Simplification and standardization of manufacturing methods, in fact anything that will lead to the saving of time, labor, material, or to improved quality and service, in an attempt to improve efficiency, are also desirable adjuncts. If all industries will join in this movement and assist in making it truly national in scope, a tremendous step forward will be taken, not only in pointing out the evil effects of waste but in contributing toward the establishing of practical and inexpensive methods of accomplishing its elimination."

The movement is in accord with the best principles operating today and should commend itself to the sympathies of all good citizens,—particularly the architects and engineers.

FITZGIBBONS
Smokeless Down-Draft
BOILERS



THE design of these boilers is recognized by the heating profession as most effective for the burning of soft coal smokelessly.

At the same time it is equally successful in burning any coal or oil fuel, not only without smoke, but also with excellent efficiency and satisfying economy.

Backing the design is a riveted, all-steel construction representative of the highest standards of boiler building. In every detail these boilers meet the provisions of the A. S. M. E. Code and all State and Municipal Codes.

Write for the Smokeless Down-Draft descriptive bulletin.

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REVIEWS AND ANNOUNCEMENTS

Joseph G. Ludgin announces the removal of his office to the London Guarantee & Accident Building, 360 North Michigan Avenue, Chicago.

Coggins & Hedlander, and George H. Petit, Associate, announce the opening of new offices at 45 East Putnam Avenue, Greenwich, Conn.

Announcement is made of the dissolution of the firm of Wallin & Comer. Arthur F. Comer has established independent practice at 909 Realty Building, Savannah.

Lutah Maria Riggs and William Allen Horning, for many years in the office of the late George Washington Smith, announce the formation of a partnership for the completion of Mr. Smith's work still in hand and for the general practice of architecture at 17 Mesa Road, Montecito, Cal.

JOHNS-MANVILLE CORPORATION, 292 Madison Avenue, New York. "Sanacoustic Sound-Absorbing Tile."

In large office areas, certain departments of banks, and in many other places where much use is made of adding machines, typewriters and similar items of equipment it is necessary to adopt some means of deadening or at least reducing the noise produced by these highly important tools of business. In other instances it is necessary to provide the best conditions for hearing or prevent the penetration of sound into adjoining areas. Much has been written regarding use of different means of accomplishing these results, and many eminent men have devoted years to the study of what architects and engineers know as "acoustics." The Johns-Manville Corporation is widely known for the variety and excellence of the building materials which it produces, and among its many products there is perhaps none more useful or more widely known than "Sanacoustic Sound-Absorbing Tile." This brochure deals with the subject in the way adopted by the Johns-Manville Corporation in advertising all its materials, describing it in text and fully illustrating it by diagrams and cuts made from actual photographs. That it is being used in structures of many types is proved by the list upon page 7 which names some of the buildings in which Sanacoustic Sound-Absorbing Tile have been installed,—structures in all parts of the country, among them being banks, offices, stores, theaters and auditoriums, churches and schools, hotels and buildings of other kinds.

GRINNELL COMPANY, Providence. "Thermoflex Heating Specialties; Data Sheets." A useful booklet on their use.

Introduction of a new line of heating appliances manufactured by a process that mechanically tests the working parts to many times their designed operating pressures is announced by the Grinnell Company in two recent publications. These devices, comprising the Thermoflex line of traps, valves and related accessories, employ Hydron bellows for all working parts which operate thermostatically. The Hydron bellows are manufactured under hydraulic pressure sufficient to burst the metal if any part is defective. This tested-in-the-making process assures the buyer of uniformly perfect mechanism,—a vital requirement in the satisfactory operation of modern steam and vapor heating systems. In addition to this mechanical testing, the Grinnell Company has engaged, under contract, the services of the Pittsburgh Testing Laboratory to individually inspect, test and certify every Thermoflex device employing the Hydron bellows. Each of these units is thus shipped with a certification tag attached by the inspection laboratory staff representative, giving double assurance to the user that the appliance meets the highest standards. Announcement of these devices was first made in an attractive folder entitled "Grinnell Discovers a Superior Heating Trap." This folder contains a typical data sheet and a specimen tag of the Pittsburgh Testing Laboratory. Supplementing this announcement is a complete Thermoflex data book containing design and specification information relating to these devices.

P. C. Smith, 86 Porchester Terrace, London, W. 2, wishes to receive the catalogs and other publications of American manufacturers.

Ivan H. Riley & Company announce their removal from 3401 South Parkway to the Old Dearborn Bank Building, 203 North Wabash Avenue, Chicago.

Walter A. McDougall announces his removal to new offices in the London Guarantee & Accident Building, 360 North Michigan Avenue, Chicago.

Through inadvertence, THE ARCHITECTURAL FORUM published in its February issue an advertisement featuring the Williamsburg Savings Bank Building, Brooklyn, naming the architect but without mentioning the engineer. Credit for the engineering is due to Frank Sutton.

AN ANNOUNCEMENT

In December last, a group of inspecting engineers and representatives of testing laboratories from all sections of the country, met in Detroit, and formed a preliminary organization among those engaged in the practice of testing and supervising the manufacture and use of various engineering materials for construction work of federal, state and city governments, public service corporations, railroad and highway construction and maintenance, bridges, office, manufacturing, educational and other building projects. At a second meeting held April 3 and 4, also at Detroit, the success of the preliminary gathering was continued, and there was finally concluded the formation of the National Engineering Inspection Association. The officers elected were: Watson Vredenburgh, president of Hildreth & Company, Inc., New York, as President; J. D. Stoddard, vice-president of the Detroit Testing Laboratory, as Vice-President; and B. H. Witherspoon, president of the Pittsburgh Testing Laboratory, as Secretary-Treasurer. The Board of Directors includes the officers and a representative from each of the four geographical sections of the country: Henry Gulick, president of Gulick-Henderson Company, New York, for the eastern section; James H. Herron, president of the James H. Herron Company, Cleveland, for the mid-western section; F. B. Porter, president of the Southwestern Laboratories, Fort Worth, for the southern section; Abbot A. Hanks, president of Abbot A. Hanks, Inc., San Francisco, for the western section.

The Association adopted complete constitution and by-laws, and code of ethics. The constitution declares that the object of the Association is "to promote proper understanding and coöperation among those engaged in and concerned with engineering inspection; to establish practices which will prove beneficial to proper service; and to develop and encourage better and more effective inspection methods." Provisions are made also for constant supervision of the affairs of the Association by the officers and Board of Directors as well as for semi-yearly general meetings. The charter membership consists of 20 individuals, partnerships or corporations distributed throughout the country, seven from the eastern section, seven from the mid-western and southern sections, and six from the western section. It is expected that a number of additional memberships will be secured through the method of application and election prescribed by the constitution and by-laws which were recently adopted.

VAN RENSSELAER P. SAXE, C.E.

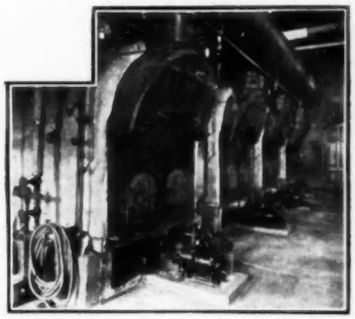
Consulting Engineer

STRUCTURAL STEEL
CONCRETE CONSTRUCTION

217 North Calvert Street Baltimore

The HARDINGE

will burn the oils *of* 1940



A typical Hardinge commercial installation—in an Eastern orphanage, where in one year the Hardinge saved $2,500 over soft coal.

TO anyone who knows machinery, the Hardinge is a work of art. The trained eye sees all the extra refinements—little things, perhaps, but the same kind of little things that mark the difference between an automobile that merely runs, and another that runs beautifully. The Hardinge is pridefully built by men who express themselves in fine machinery even as you do in fine buildings.

And aside from mechanical excellence, another valuable "extra" that you get in a Hardinge is design foresight. In building a burner to last as long as the Hardinge, the fuels of the future had to be considered. With more and more gasoline being cracked from the crude oil, there will always be fuel oils, but they may change considerably in character.

Burners that require certain prescribed fuel oils may then cost considerably more to operate. But not the Hardinge, for this burner uses any available fuel oil, and moreover, it burns that oil at that oil's highest efficiency. This is a present operating economy, and an assurance of continued and economical service.

We have some handy oil burner working data and a new and informative Hardinge booklet for architects that we'll gladly send you upon request. Hardinge Brothers, Inc., 4149 Ravenswood Avenue, Chicago.

HARDINGE

Fuel Oil Burners for Every Purse and Purpose From Bungalow to Skyscraper

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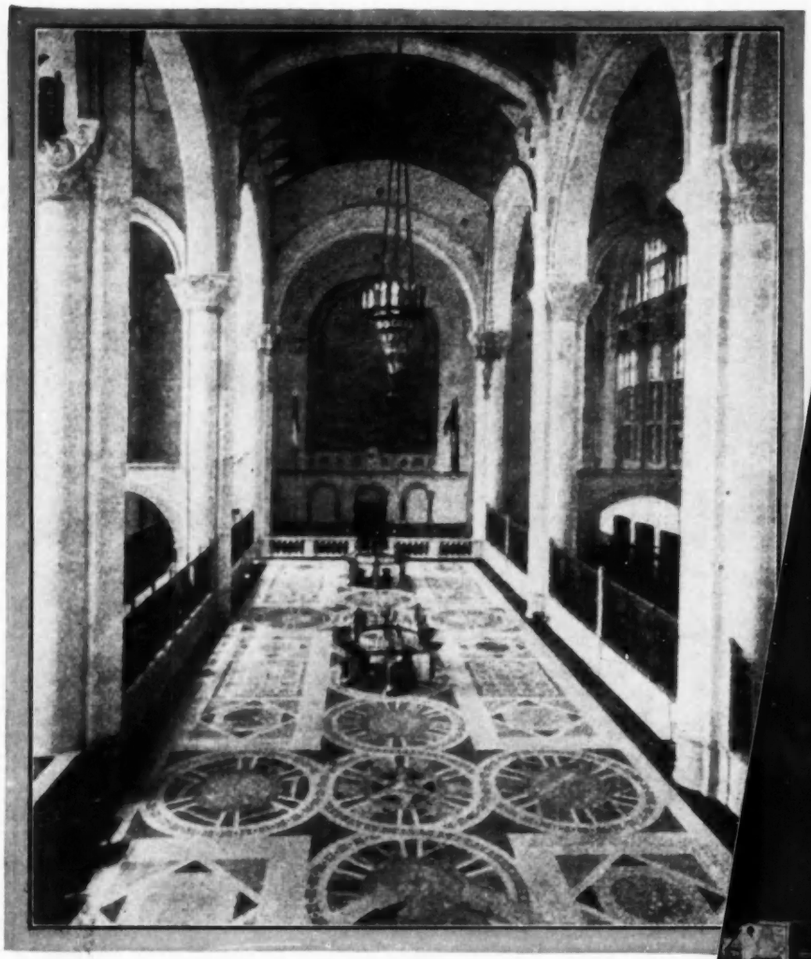

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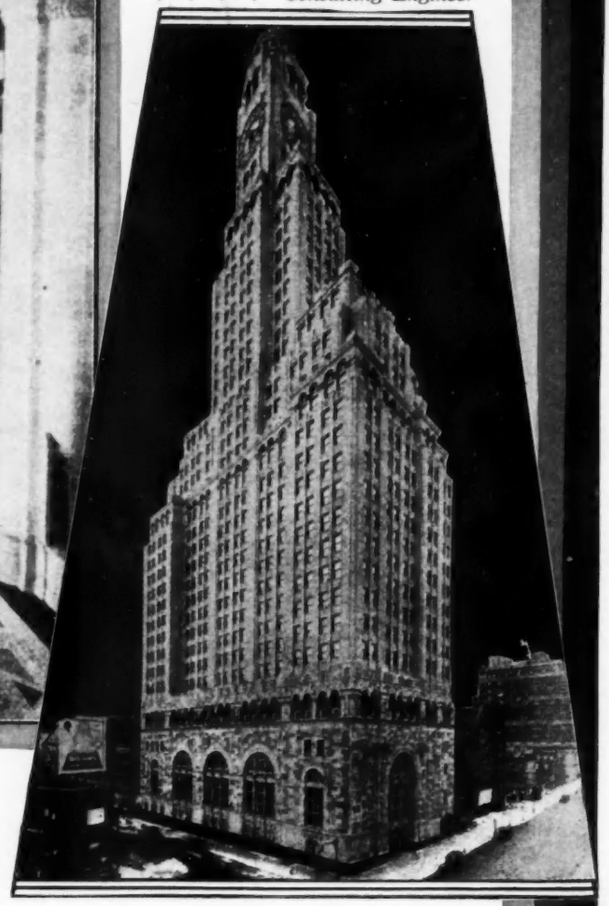

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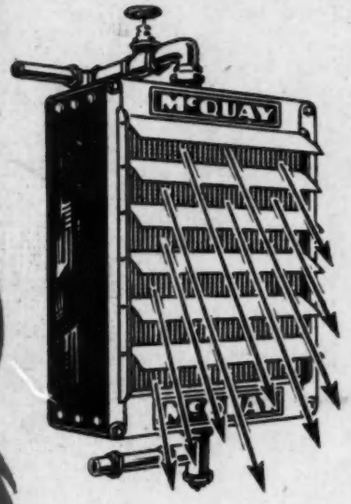

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